

1.5 Theory of the firm and market structures – production and costs (HL)

Learning Outcomes

- Distinguish between the short run and long run in the context of production.
- Define total product, average product, and marginal product and construct diagrams to show their relationship.
- Explain the law of diminishing returns.
- Calculate total, average, and marginal product from a set of data and/or diagrams.

Subject vocabulary

short run a period of time when at least one factor is variable and the others are fixed

factors of production the inputs into the production process (land, labour, capital and entrepreneurship)

long run a conceptual moment in time when all factors are variable

output the quantity of goods produced by a firm, industry or economy

capital (goods) manufactured goods that are used in the production of other goods

productive capacity the maximum possible output of a firm, industry, or an economy

manufacturer a person or company that makes products

specialized designed for a specific function

variable factor a factor of production, the quantity of which can vary

total product number of units of output produced in a given period of time

average product the amount of total output produced per unit of the variable factor whilst holding all other factors constant

marginal product the change in total output brought about by a change in the quantity of the variable factor used in production

workshop an area where small-scale production takes place

production the act of making goods and service.

Distinguish between the short run and the long run in the context of production

In the **short run** the quantity of at least one **factor of production** is fixed and in the **long run** all factors are variable. In the short run a car producer might be able to increase **output** by employing more workers but be unable to increase the amount of **capital**. A farmer might be able to increase the amount of capital and labour but not be able to increase the amount of land needed to grow more output. It takes time to increase **productive capacity**. For example, the car **manufacturer** must order the capital from the manufacturer. Capital is **specialized** and can take a long time to make. After the firm has received the machines it can add the **variable factor** labour to the higher level of capital in order to increase output. When the firm wants to raise the level of capital again it must go through this process.

Define total product, average product, and marginal product and construct diagrams to show their relationship

Total product (TP) is the number of units of output produced in a given period of time. **Average product** (AP) is the quantity of total output produced per unit of the variable factor while holding all other factors constant. AP is calculated by dividing total product by the quantity of the variable factor used. $AP = TP/V$ where TP is total product and V is the quantity of the variable factor. **Marginal product** (MP) is the change in total output brought about by adding one more unit of the variable factor.

Labour	TP	AP	MP
0	0		
1	4	4	4
2	9	4.5	5
3	15	5	6
4	20	5	5
5	24	4.8	4
6	26	4.33	2
7	26	3.7	0
8	24	3	-2

Table 23.1

The quantity of labour is variable and the quantity of capital is fixed. Table 23.1 shows the effect on TP, AP, and MP of employing one more worker in a small **workshop**. Add the first worker to the capital and **production** can begin. The MP is the gain in output resulting from employing the additional worker. For example, the MP of worker 1 is 4 units and the MP of worker 4 is 5 units. MP appears between each change in the number of workers because it shows the change in output as we move from one quantity of workers to the next.

Calculations of AP and MP – a step-by-step guide

Trouble shooter

Add the first worker. Quantity of workers changes from 0 to 1 and output changes from 0 to 4:

$$AP = TP/V = 4/1 = 4$$

$$MP = \Delta TP / \Delta V = (4 - 0) / (1 - 0) = 4/1 = 4$$

Add the next worker. Quantity of workers changes from 1 to 2 and output increases from 4 to 9 units:

$$AP = TP/V = 9/2 = 4.5 \text{ units}$$

$$MP = \Delta TP / \Delta V = (9 - 4) / (2 - 1) = 5/1 = 5$$

Add the next worker. Quantity of workers changes from 2 to 3. Output changes from 9 to 15 units:

$$AP = TP/V = 15/3 = 5 \text{ units}$$

$$MP = \Delta TP / \Delta V = (15 - 9) / (3 - 2) = 6/1 = 6 \text{ units}$$

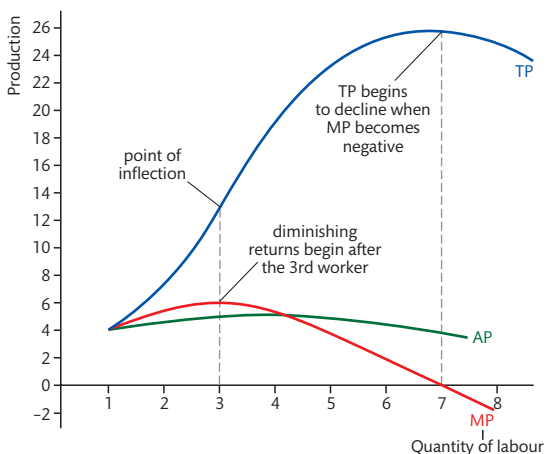
Add one more worker. Quantity of workers changes from 3 to 4. Output changes from 15 to 20 units:

$$AP = TP/V = 20/4 = 5 \text{ units}$$

$$MP = \Delta TP / \Delta V = (20 - 15) / (4 - 3) = 5/1 = 5 \text{ units}$$

What is the law of diminishing returns to a factor?

The law states that as more units of the variable factor are added to a given quantity of the fixed factor the additional output gained from each additional unit of the variable factor employed will at some point begin to fall. At first as additional workers are added output rises at an increasing rate as can be seen in the calculations shown above. From 0 to 3 workers the increase in output from employing the next worker is greater than the



increase in output from employing the previous worker. MP is increasing as each worker is added. This is increasing marginal returns to a factor. The additional output gained from adding the fourth worker is less than the gain from adding the third worker. As more workers are added output continues to increase but at a diminishing rate. This is the law of diminishing marginal returns to a factor. Adding the eighth worker causes output to fall from 26 to 24 units: $MP = -2$.

The information in Table 23.1 is plotted on to the graph Figure 23.1.

Figure 23.1

Why do AP and MP rise and then fall?

When 1 worker is employed in the workshop she has to do all of the work: collecting the **raw materials**, operating the machine, repairing the equipment, cleaning up, and so on. Add another worker whose job is to collect the raw materials and the first worker can spend more time operating the machine producing output. Add another to specialize in cleaning and even more time can be spent on production. Each worker specializes in doing one job and they become quick and good at it. Look at Table 23.1. Average product or output per worker increases from 0 to 3 workers. **Labour productivity** is rising. As more workers are added the workshop becomes overcrowded. Workers get in each other's way. Diminishing marginal returns to a factor set in at 3 workers. This is the **point of inflection** on the diagram and where the MP curve is at its highest point. Output is still increasing as workers are added but at a diminishing rate.

Subject vocabulary

raw material the basic material from which a good is made

labour productivity the quantity of goods that a worker produces in a given period of time

point of inflection the point at which there is a change in the direction of a curve

Synonyms

drag(s) pull(s)

firm business/
producer/
supplier

scarce limited/finite

sum total

incur experience/
encounter

MP becomes negative after the seventh worker. Adding the eighth worker reduces output. The TP curve begins to slope downwards at this point and the MP curve dips under the horizontal axis.

If the addition to output from the next worker (MP) is greater than the average output per head (AP), employing the next worker will increase the average and productivity increases. If the addition to output (MP) is less than the average output per head (AP) employing the next worker will **drag** down the average and productivity falls. Therefore $AP = MP$ at AP's highest point.

Trouble shooter

To help you understand the relationship between AP and MP think about the following situation. A footballer has played 10 games and has scored 10 goals. The average number of goals per game = total number of goals/quantity of games = $10/10 = 1$ goal. He plays the eleventh game and scores 4 goals. The addition to the total number of goals scored is 4 and this is greater than the average of 1 goal per game. Therefore the average will increase: $(10 + 4) / (10 + 1) = 14 / 11 = 1.27$ goals per game. Work out what happens to the average if he scores 1 goal in the next game. Now work out the average when he scores zero goals in the next game.

Test your understanding of this unit by answering the following questions

- Using a diagram to illustrate your answer, explain the relationship between total product, average product, and marginal product.

Learning Outcomes

- Explain the meaning of economic costs as the opportunity cost of all resources employed by the firm (including entrepreneurship).
- Distinguish between explicit costs and implicit costs as the two components of economic costs.
- Explain the distinction between the short run and the long run, with reference to **fixed costs** and variable costs.
- Distinguish between total costs, marginal costs, and average costs.
- Draw diagrams illustrating the relationship between marginal costs and average costs, and explain the connection with production in the short run.
- Explain the relationship between the product curves (average product and marginal product) and the cost curves (average variable cost and marginal cost), with reference to the law of diminishing returns.
- Calculate total fixed costs, total variable costs, total costs, average fixed costs, average variable costs, average total costs, and marginal costs from a set of data and/or diagrams.

Subject vocabulary

fixed cost a business cost that does not change as the quantity of goods or services the business produces changes, such as rent

economic cost of production the sum of explicit costs and implicit costs

opportunity cost the next best alternative forgone

resources the inputs into the production process, the factors of production

explicit costs payments made by firms for inputs such as wages, rent and payments for raw materials

implicit costs the opportunity cost of using resources which are self-owned and not purchased

Explain the meaning of economic cost

Model sentence: The **economic cost of production** is the **opportunity cost of production**. If a **firm is using its scarce resources** to make a good it then cannot use them to make the next best alternative. The opportunity cost is the value that would have been gained had the resources been used to produce the next best alternative.

Economic costs of production are the **sum** of **explicit costs** and **implicit costs**. The distinction between the costs is best explained using an example.

Distinguish between explicit and implicit costs – a step-by-step guide

Trouble shooter

Maria is an **entrepreneur** who opened a restaurant. In order to do this she gave up a job paying €60,000 per year and used €20,000 from her **savings** to pay the **start-up costs**.

The business or **accounting costs** included rent, wages, **raw materials**, gas, and electricity. The sum of these costs in the first year was €100,000. Economists call accounting costs explicit costs and these are the market value of the resources bought by the entrepreneur from other individuals and firms. For example, there is a market for property and the value of the rent (an explicit cost) is determined by **the forces of demand and supply** in this market.

Maria's calculation of her costs differed from the accountant's. She gave up her time to become an entrepreneur and to work in her restaurant. Time that she could use to earn €60,000. Therefore the next best use of her time is valued at €60,000. She spent €20,000 of her own savings that could earn 5% **interest**. The next best use of the €20,000 savings is valued at €1000.

These are the hidden costs which economists call implicit costs. Maria's time and savings are her own resources. She did not pay somebody for them. Their value is given by their opportunity cost which is the amount that her self-owned resources could earn if put to the next best alternative use.

Maria's accounting costs = €100,000

Her economic costs = explicit costs + implicit costs = €100,000 + €61,000 = €161,000.

Explain the distinction between the short run and the long run, with reference to fixed costs and variable costs

In the **short run** the quantity of at least one **factor of production** into the production process is fixed. In the **long run** the quantities of all factors are variable. Fixed factors give rise to fixed costs and variable factors give rise to **variable costs**.

Total fixed costs (TFC) are the sum of the costs that do not change as **output** changes. In the short run the costs are **incurred** even if output is zero. Rent is a fixed cost. The rent is the same no matter how many units are produced and must be paid even if the firm stops producing.

Total variable costs (TVC) are the sum of the costs that change as output changes. To increase output the firm needs to buy more raw materials and pay for more workers therefore variable costs rise. These costs are only incurred when the firm is producing goods.

Total cost (TC) = Total fixed cost + Total variable cost

Output	TFC	TVC	TC	AFC	AVC	ATC	MC
0	100	0	100				
1	100	100	200	100	100	200	100
2	100	180	280	50	90	140	80
3	100	230	330	33.33	76.67	110	50
4	100	260	360	25	65	90	30
5	100	280	380	20	56	76	20
6	100	290	390	16.67	48.33	65	10
7	100	325	425	14.29	46.43	60.7	35
8	100	400	500	12.5	50	62.5	75
9	100	510	610	11.11	56.67	67.78	110
10	100	650	750	10	65	75	140

Table 24.1

Table 24.1 shows calculations for all types of costs from 0 to 10 units of output.

Subject vocabulary

entrepreneur an individual who, in pursuit of profit, brings together the other factors of production in order to produce a good or service

savings income that is not spent

start-up costs expenses linked to setting up a new business before it starts producing and selling goods or services

accounting cost the value of resources bought from individuals or firms (explicit costs)

raw material the basic material from which a good is made

forces of demand and supply changes in the determinants of demand and supply in a market that affect the market price and the allocation of resources

interest the price paid for the use of borrowed money/ the money earned from bank deposits

short run a period of time when at least one factor is variable and the others are fixed

factors of production the inputs into the production process (land, labour, capital and entrepreneurship)

long run a conceptual moment in time when all factors are variable

variable costs costs that change as the level of output changes

total fixed cost the sum of the costs that do not change as output changes

output the quantity of goods produced by a firm, industry or economy

total variable cost the sum of the costs that change as output changes

total cost the sum of total fixed cost and total variable cost

average total cost equal to total cost divided by quantity of output

average fixed cost equal to total fixed cost divided by quantity of output

average variable cost equal to total variable cost divided by quantity of output

marginal cost the change in total cost resulting from a change in output of one unit

Why does the AFC curve slope downwards? (see table 24.1 on page 67)

TFC = \$100 at all levels of output because fixed costs do not change as output changes.

AFC is the fixed cost per unit of output.

$AFC = TFC/Q$: At 1 unit of output $AFC = 100/1 = \$100$ and at 10 units $AFC = 100/10 = \$10$.

TFC does not change with output therefore as output increases AFC falls.

As shown in Figure 24.1 the AFC curve falls as output increases.

Why is the average variable cost curve U-shaped?

TVC is the sum of the costs that change with output. As output rises TVC rises. AVC is the variable cost per unit of output.

Here are some calculations of AVC ($AVC = TVC/Q$): at 1 unit $AVC = 100/1 = \$100$. At 7 units $AVC = 325/7 = \$46.43$. At 10 units $AVC = 650/10 = \$65$.

As output increases between 1 and 7 units AVC falls from \$100 to \$46.43. Between 7 and 10 units AVC rises from \$46.43 to \$65. In the short run the firm adds variable factors of production to the fixed factor in order to increase output. To begin with, when workers are added **average product** rises at an increasing rate. Output per worker increases because the rate of change in output is greater than the rate of change in the number of workers. AP rises at an increasing rate because as more workers are added they can specialize in doing one job and they become quick and very good at performing that one task. Therefore the rate at which output increases is greater than the rate at which the cost of the **variable factor** increases. $AVC = TVC/Q$, so if Q increases at a greater rate than total variable costs AVC falls. This occurs because eventually, as more workers are added to the fixed quantity of capital **diminishing average returns** set in and average product falls. At some point, as more and more workers are added to a fixed quantity of capital, the additional output produced by the next worker falls below the additional output produced by the addition of the previous worker. This occurs because the work-place becomes overcrowded and workers begin to get in each other's way. Therefore the rate at which the cost of the variable factor increases is greater than the rate at which output increases. The output per worker falls resulting in an increase in the cost per unit of output. As shown in Figure 24.1 the AVC curve initially falls as output increases but begins to rise when diminishing returns to the variable factor set in.

Subject vocabulary

average product the amount of total output produced per unit of the variable factor whilst holding all other factors constant

variable factor a factor of production, the quantity of which can vary

diminishing average returns to labour as more workers are added to a fixed quantity of capital, the output per worker will at some point begin to fall

marginal product the change in total output brought about by a change in the quantity of the variable factor used in production

Why is the average total cost curve U-shaped?

ATC is the total cost per unit of output. $ATC = AFC + AVC$. ATC, like AVC, initially falls as output increases and eventually begins to rise. As output increases from 1 to 7 units ATC falls and then begins to rise. AVC is included in ATC so ATC falls and then eventually rises for the reasons already explained. In Figure 24.1 the ATC curve like the AVC curve is U-shaped. At first as output increases falling AFC has a major impact on ATC dragging it down but as output continues to rise the rate at which AFC falls begins to diminish so its effect on ATC lessens. However as output continues to increase, eventually diminishing returns to labour set in and AVC begins to rise. As AFC falls at a diminishing rate and AVC begin to rise at some point as output increases ATC will begin to rise.

Why is the marginal cost curve U-shaped?

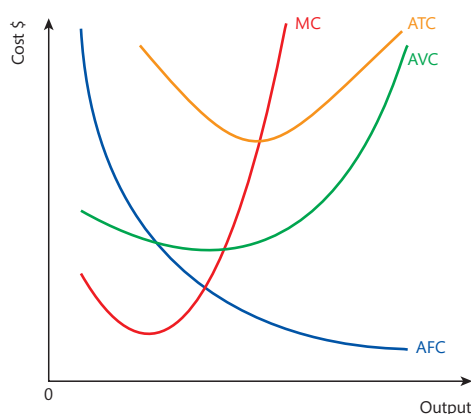


Figure 24.1

Marginal cost is the change in total cost resulting from a change in output of one unit. Here are some calculations: between 0 and 1 output changes 1 unit and TC increases from 100 to 200, a change of \$100. $MC = 100/1 = \$100$ and so between 5 and 6 units $MC = 10/1 = \$10$ and between 6 and 7 units $MC = 35/1 = \$35$.

Initially when workers are added **marginal product** increases. This means that the addition to output from adding the next worker is greater than the extra output gained from adding the previous worker. The rate of change in output gained from adding one more worker continues to increase therefore the additional cost of the next unit produced falls. Therefore the firm is experiencing

increasing marginal returns to the variable factor. At some point as more and more workers are added to the fixed capital **diminishing marginal returns to the variable factor** set in. Marginal product begins to fall: the additional output gained from adding another worker is less than the additional output gained from adding the previous worker. The additional cost per unit of output therefore begins to rise. In Figure 24.1 the MC curve, like the ATC and AVC curves, is U-shaped.

Figure 24.1 shows the relationship between the average cost curves and marginal cost curve in the short run when at least one factor is fixed.

As output increases AFC falls. $ATC = AFC + AVC$. Therefore the difference between ATC and AVC is AFC. AFC falls as output increases and the difference between ATC and AVC gets smaller. So as output increases the distance between the two curves gets smaller.

Why does $MC = ATC$ at the lowest average cost per unit?

If the addition to total cost from the production of one more unit (MC) is greater than the total average cost then producing that unit will increase ATC. If the addition to total costs is less than the average total cost then producing the unit will reduce ATC.

Model sentence: When marginal cost is less than average total cost increasing output lowers average total cost and when marginal cost is greater than average total cost increasing output increases average total cost. Therefore marginal cost per unit of output equals total average cost per unit at the lowest possible total average cost per unit. This means that the marginal cost curve cuts the average total cost curve at the average total cost curve's lowest point.

Test your understanding of this unit by answering the following questions

- Distinguish between explicit costs and implicit costs.
- Explain why the average variable cost curve is U-shaped.

Subject vocabulary

increasing marginal returns to a variable factor as more of a variable factor is added to a quantity of fixed factors the product of each additional unit of the variable factor increases

diminishing marginal returns to a variable factor as more of a variable factor is added to a quantity of fixed factors the product of each additional unit of the variable factor will, at some point, begin to fall

Learning Outcomes

- Distinguish between increasing returns to scale, decreasing returns to scale, and constant returns to scale.
- Outline the relationship between short-run average costs and long-run average costs.
- Using a diagram, explain the reason for the shape of the long-run average total cost curve.
- Describe factors giving rise to economies of scale, including specialization, efficiency, marketing, and indivisibilities.
- Describe factors giving rise to diseconomies of scale, including problems of coordination and communication.

What is the relationship between short-run average costs and long-run average costs?

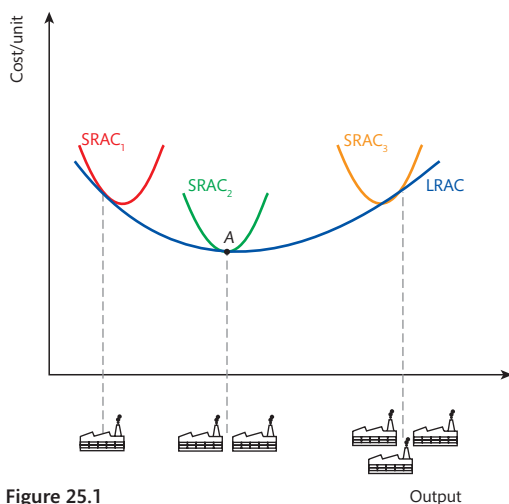


Figure 25.1

In the **long run** the quantities of all **factors of production** that the firm can use are variable. The firm can change the number of factories and capital. Workers are added to capital that is variable not fixed therefore the law of diminishing returns to a factor cannot be applied in the long-run.

Production in the long-run consists of a series of **short-run** periods of production where workers are added to a fixed quantity of factors. In the example in Figure 25.1 workers are added to the first factory containing a fixed quantity of capital. At first workers' **productivity** increases but at some point it begins to decrease therefore SRAC per unit falls and then rises resulting in the U-shaped short-run average cost curve $SRAC_1$. The firm

Subject vocabulary

long run a conceptual moment in time when all factors are variable

factors of production the inputs into the production process (land, labour, capital and entrepreneurship)

production the act of making goods and services

short run a period of time when at least one factor is variable and the others are fixed

productivity the quantity of output per unit of input

Subject vocabulary

output the quantity of goods produced by a firm, industry or economy

tangential describes a line that just touches a curve at one point, without cutting across it

economies of scale the cost advantages gained by a firm from increasing the scale of its production. Average cost falls in the long run as the size of a firm's operation increases.

large-scale production/ mass production the making, usually on assembly lines, of large quantities of a uniform product

resources the inputs into the production process, the factors of production

raw material the basic material from which a good is made

revenue the income a firm receives from consumers in exchange for goods (revenue = price \times quantity sold)

asset an item of value owned by an individual or firm, especially one that could be converted to cash

loan repayment money paid back by the borrower of the loan to the lender

specialization the performing of specific tasks in the workplace

producer revenue the income a firm receives from consumers in exchange for goods (revenue = price \times quantity sold)

output per head a measure of the productivity of the workforce (output divided by the number of workers)

demand the amount of a good that consumers are willing and able to buy at each price

specialized designed for a specific function

Glossary

negotiate reach an agreement through discussion

assembly line an arrangement of workers and machines in a factory along which the good being made passes from one operation to the next until the good is completed

can increase **output** by adding more workers but as productivity starts to fall SRAC begin to rise. If the firm wants to increase output and raise productivity thereby continuing to bring down average costs per unit it must increase the quantity of fixed factors, which it can do in the long-run. The firm opens a second factory and workers are now added to a greater quantity of fixed factors. Productivity at first increases but eventually decreases giving rise to $SRAC_2$. Average cost per unit has fallen and is at the lowest point on the SRAC curve as a result of increasing the quantity of fixed factors. After the third factory is opened workers are added to a greater quantity of fixed factors giving rise to $SRAC_3$. Average-cost per unit has risen. Increasing output beyond point A leads to an increase in average costs per unit. At first average cost per unit in the long-run falls as workers are added to increasing quantities of fixed factors but at some level of output average cost per unit begins to rise as the number of fixed factors is increased.

The long-run average cost curve is a **tangential** to the short-run average cost curves. Note that as long-run average costs are falling the point of tangency is where short-run average costs are also falling and as long-run average costs increase the point of tangency is where short-run average costs are also increasing. LRAC curve is tangent to SRAC curve at SRAC curve's lowest point only when output is produced at lowest average cost possible, which is the lowest point on the LRAC curve.

Why do average costs per unit fall and then rise in the long run?

As the firm increases the quantity of fixed factors and increases output it gains **economies of scale** until the LRAC curve turns upwards. These are the cost advantages of **large-scale production** that are not available to smaller firms.

Monetary economies of scale occur when firms are able to reduce the price paid for **resources**. The reductions in costs are because of the power the large firm has in the market place. It produces lots of goods and therefore buys lots of **raw materials** in bulk and can **negotiate** a lower price with the supplier reducing the cost of their raw materials. A large firm employs lots of workers. It may be the biggest employer in an area. As a very big buyer of labour it is able to push down wages, thereby reducing labour costs. Cost savings enjoyed by firms who are able to buy resources in very large quantities are called marketing economies of scale.

Financial economies of scale are enjoyed by large firms because banks are more likely to lend to large firms and lend at a lower interest rate. This is because large firms have larger **revenues** and more **assets**, therefore the risk of defaulting on the loan is less than it is for smaller firms. Banks compete with each other for the firm's business. This pushes down the interest rate thereby reducing the cost of **loan repayments**. Real-economies of scale occur when reductions in cost are brought about by increases in productivity gains from large scale production. **Specialization** and the division of labour occurs the most when goods are mass produced. The production process is broken down into a large number of smaller separate tasks on an **assembly line**. Each worker performs one particular task all the time. By specializing in only one task the worker becomes very quick at performing it. Specialization and division of labour greatly increases output per worker thereby reducing average cost per unit. Managerial economies of scale are enjoyed by large firms because they are able to hire the best and most efficient workers in all areas of the business. A good tax accountant, for example, can reduce the firm's tax liability thereby reducing costs.

A big firm earns large **producer revenues** and can afford the high cost of the most technologically advanced large-scale capital. Using it can massively increase **output per head** and reduce average cost per unit. This type of capital is indivisible. The cost of it is the same no matter how many goods are produced. It is only profitable to buy this capital if it can be used a lot of the time. The cost can then be spread over a very large number of units. Small firms with lower output cannot use this type of capital because average cost per unit would be far too high.

A small firm is not able to run a national advertising campaign because of the high cost of doing so. A large firm is able to spread the cost over a large number of units, thereby massively reducing the average cost per unit of advertising. A large firm can afford to run an international marketing campaign. The cost of making a TV commercial is the same no matter how many people see it and the more people that see it the lower the cost per potential customer.

However, firms must be careful. If **demand** falls the firm must reduce output and stop using all the large-scale capital. The cost of the capital will be spread over fewer units of output and average cost per unit will increase. This will reduce profits. Also some capital is highly **specialized** and if demand falls for the good the capital cannot be used to produce alternative goods that are in demand. This means it will have little resale value.

Model sentence: Monetary economies of scale occur when large firms use their market power to negotiate lower prices with their suppliers of resources, thereby reducing average costs per unit. Real economies occur when firms are able to use resources more efficiently, thereby increasing productivity and reducing average costs per unit.

As a firm continues to grow it experiences **diseconomies of scale** and long-run average costs begin to rise. A large firm finds it more difficult to respond to changes in the market. It will have a complex management structure. The firm will experience communication problems and instructions from management can be misunderstood, sometimes deliberately as some managers in the organization may well have different objectives. The large organization has to employ more workers who are not directly involved in the production of goods. This increases the number of workers but not output, resulting in a fall in **productivity** and an increase in average cost per unit. Workers who work on the shop floor and who specialize doing the same task all the time will be bored and demotivated. The firm is likely to see a rise in **absenteeism** and a fall in output per head giving rise to increases in average costs. As a firm grows in size and the production process becomes more unwieldy it becomes more difficult for managers to coordinate resources effectively, including supervision and organization of the workers. It's difficult to make sure all workers are trying to achieve the set goals of the firm as the workforce gets bigger. These problems lead to a fall in productivity and a rise in long-run average costs.

What is the difference between increasing returns to scale, decreasing returns to scale, and constant returns to scale?

Returns to scale

In order to increase output the firm increases factors of production. The firm experiences **increasing returns to scale** when the rate of change in factors leads to a greater rate of change in outputs. When a 10% increase in factors leads to a 30% rise in output average cost per unit falls. Increasing returns are made possible because

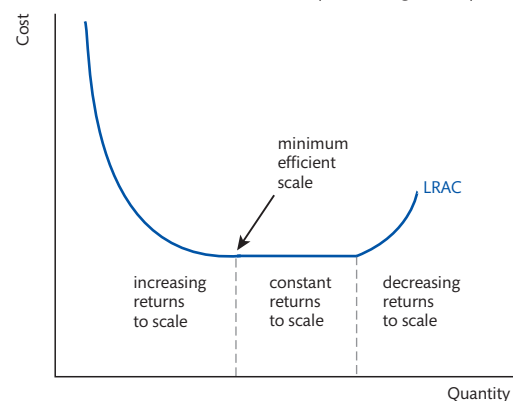


Figure 25.2

of the economies of scale enjoyed by firms that are expanding output. At some point the economies are **exhausted** and **constant returns to scale** are experienced where the rate of change in factors is equal to the rate of change in output. Average costs per unit remain the same. As output increases further the firm experiences diseconomies of scale causing **decreasing returns to scale** where the rate of change in factors is now greater than the rate of change in output. Average cost per unit increases. The minimum efficient scale of production is the lowest level of output where average cost is at its lowest.

Test your understanding of this unit by answering the following questions

- Explain why the long-run average cost curve is U-shaped.
- Explain the relationship between short-run average costs and long-run average costs.
- Explain why decreasing returns to scale will eventually set in as a firm grows.

Subject vocabulary

diseconomies of scale the cost disadvantages experienced by a firm when increasing the scale of its production. Average costs rise in the long run as the size of a firm's operation increases beyond a certain point.

productivity the quantity of output per unit of input

increasing returns to scale the situation in which increasing the inputs in production leads to a proportionally greater increase in output

constant returns to scale the rate of change in inputs is equal to the rate of change in outputs

decreasing returns to scale as the amount of all factors of production are increased, the resulting additional output falls

income the payment received by the factors of production (e.g. wages paid to labour, rent paid to the owners of land)

total revenue price \times quantity sold

average revenue revenue per unit of output (= total revenue/output)

marginal revenue the additional revenue generated from the sale of the additional unit of output produced

Glossary

absenteeism how often a worker does not go to work

exhausted used up completely

Learning Outcomes

- Distinguish between total revenue, average revenue, and marginal revenue.
- Calculate total revenue, average revenue, and marginal revenue from a set of data and/or diagrams.
- Illustrate, using diagrams, the relationship between total revenue, average revenue, and marginal revenue.

Explain the distinction between total, average, and marginal revenue

Revenue is the **income** a firm receives from the sale of its goods in a given period of time. **Total revenue** (TR) is calculated by multiplying the price of the product it sells by quantity sold: $TR = P \times Q$. **Average revenue** (AR) is revenue per unit of output and is calculated by dividing total revenue by quantity sold: $AR = TR/Q$. **Marginal revenue** (MR) is the addition to total revenue gained from the sale of the next unit of output and it is calculated by dividing the change in total revenue by the change in output: $MR = \Delta TR/\Delta Q$.

What is the relationship between average revenue (AR) and price?

$AR = TR/Q$ and $TR = P \times Q$. Replace TR with $P \times Q$ in the formula $AR = TR/Q$ and we get $AR = P \times Q/Q$. Divide Q by Q and we get $AR = P$. If the producer sells all the units it makes at the same price then average revenue is equal to that price.

Explain the effects on different revenues when the market is perfectly competitive

Price (\$)	Output	TR (\$)	AR (\$)	MR (\$)
10	0	0		10
10	1	10	10	10
10	2	20	10	10
10	3	30	10	10
10	4	40	10	10
10	5	50	10	10
10	6	60	10	10

Table 26.1

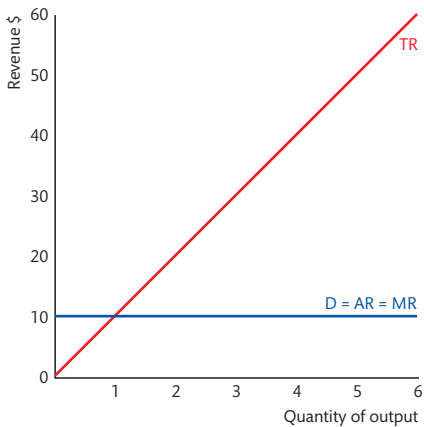


Figure 26.1

In a perfectly competitive market (we will cover perfect competition in detail later) the firm is very small and one of very many in the **industry** all selling identical goods. The firm's **output** cannot affect the **market supply** and so the firm cannot affect price but it is able to sell all that it can produce at the **market price**. The firm's **demand curve** is **perfectly price elastic** ($PED = \infty$) at market price because **quantity demanded** falls to zero when the firm increases price. This happens because consumers will stop buying from the firm and buy identical goods at a lower price from one of its competitors (for a full explanation of perfectly elastic demand see pages 20–21).

See Table 26.1 and Figure 26.1. Assume market price is \$10. The firm sells each extra unit of output at the same price therefore an increase in output of 1 unit leads to a change in total revenue of \$10: $MR = \Delta TR / \Delta Q = 10/1 = \10 . $AR = P$ therefore $AR = \$10$. TR increases at a constant rate as output increases resulting in the straight-lined TR curve.

Table 26.1 shows the information regarding revenues in a perfectly competitive market over a range of output when price = \$10. MR relates to a change in the level of output so appears midpoint between output levels. The information has been plotted onto the graph Figure 26.1.

Explain the effects on revenues for firms that face a downward-sloping demand curve

In reality the firm must lower price in order to increase quantity sold (see Table 26.2). As price falls output increases. $AR = P$ therefore AR falls as output increases. This can be seen in Figure 26.2 where the revenue curves have been plotted.

Subject vocabulary

industry a group of firms that produce the same or similar goods or services

output the quantity of goods produced by a firm, industry or economy

market supply the sum of the supply of the individual firms in the industry

market price the price determined by the interaction of demand and supply in a competitive market

demand curve a graph that shows the relationship between price and quantity demanded

perfectly price elastic at a particular price quantity demanded is infinite but falls to nothing as price changes. The absolute value of PED is equal to infinity.

quantity demanded the amount of a good consumers are willing and able to buy at a given price over a given period of time

Price (\$)	Output	TR (\$)	AR (\$)	MR (\$)
450	0	0		
				400
400	1	400	400	
				300
350	2	700	350	
				200
300	3	900	300	
				100
250	4	1000	250	
				0
200	5	1000	200	
				-100
150	6	900	150	
				-200
100	7	700	100	
				-300
50	8	400	50	

Table 26.2

Model sentence: The **slope** of the MR curve is twice as steep as the slope of the AR curve because in order to increase units sold the firm must lower the price on all units and not just on the next unit. The firm **forgoes** revenue on previous units in order to gain revenue on the additional unit sold.

A calculation of an increase in TR as output increases – a step-by-step guide (see Table 26.2)

Trouble shooter

When price = \$300 quantity sold = 3 units: $TR = \$300 \times 3 = \900

The firm lowers price from 300 to 250 and quantity sold rises to 4 units.

When price = \$250 quantity sold = 4 units: $TR = \$250 \times 4 = \1000

TR increases by \$100.

Why does TR rise?

Each of the first 3 units could have been sold for \$300 but are now sold for \$250.

Revenue **forgone** on the first 3 units = $(300 - 250) \times 3 = 50 \times 3 = \150

Revenue gained on the extra unit sold = \$250

Overall gain = $250 - 150 = \$100$. This is the MR.

$MR = \Delta TR / \Delta Q = 100 / 1 = \100

Increasing output from 3 to 4 units leads to an increase in total revenue.

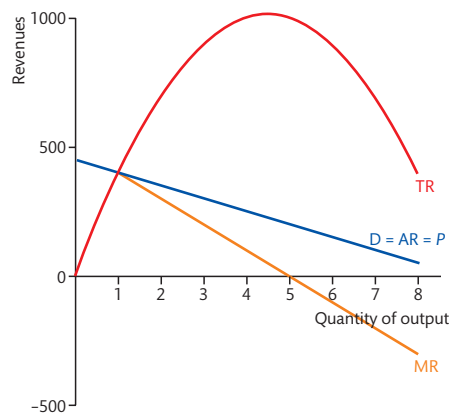


Figure 26.2

Note that MR changes in steps of 100 and AR changes in steps of 50. MR falls at twice the rate of AR.

Glossary

slope the angle/gradient of the curve

Synonyms

forgoes sacrifices/
gives up

forgone sacrificed/
given up

drag(s) pull(s)

What is the relationship between MR and TR?

As price continues to fall in order to increase sales the revenue gained from selling one more unit decreases and the loss in revenue from the units that could have been sold at a higher price increases. Therefore, marginal revenue, which is the addition to total revenue from the sale of the next unit, falls as price falls and output sold increases. Eventually MR becomes negative. This happens when the revenue gained from selling the next unit is less than the loss in revenue from the units that could have been sold at a higher price. When MR becomes negative total revenue starts to fall.

Look at Figure 26.2. As price falls and output sold increases MR is positive but falling. Therefore TR increases but at a diminishing rate. TR is maximized when $MR = 0$. When MR becomes negative it **drags** down TR.

Subject vocabulary

profit maximization where the difference between total revenue and total costs is as big as possible

economic profit the difference between total revenue (price \times quantity sold) and economic costs (explicit costs + implicit costs)

total revenue price \times quantity sold

explicit cost payments made by firms for inputs such as wages, rent, and payments for raw materials

implicit cost the opportunity cost of using resources which are self-owned and not purchased

accounting cost the value of resources bought from individuals or firms (explicit costs)

purchased resources an input into the production process that is bought by the firm or the entrepreneur from an individual or another firm

raw material the basic material from which a good is made

A calculation of a decrease in TR as output rises – a step-by-step guide (see Table 26.2 on page 73)

Trouble shooter

When price = \$200 quantity sold = 5 units: $TR = 200 \times 5 = \$1000$.

The firm lowers price to \$150 and quantity sold rises to 6 units: $TR = 150 \times 6 = \$900$.

TR decreases from \$1000 to \$900, a fall of \$100.

Why does TR fall?

Each of the first 5 units could have been sold for \$200 but are now sold for \$150.

Revenue forgone on the first 5 units = $(200 - 150) \times 5 = 50 \times 5 = \250

Revenue gained on the extra unit sold = \$150

An overall loss of \$100 ($150 - 250$). This is the MR.

$MR = \Delta TR / \Delta Q = -100 / 1 = -\100 .

Increasing output from 5 to 6 units leads to fall in total revenue.

Test your understanding of this unit by answering the following questions

- Explain why total revenue is maximized when marginal revenue = 0.
- Explain why $AR = P$.
- Explain the relationship between marginal revenue and total revenue.

Learning Outcomes

- Describe economic profit as the case where total revenue exceeds economic cost.
- Describe normal profit as the amount of revenue needed to cover the costs of employing self-owned resources (implicit costs, including entrepreneurship) or the amount of revenue needed to just keep the firm in business.
- Explain that economic profit is profit over and above normal profit, and that the firm earns normal profit when economic profit is zero.
- Explain why a firm will continue to operate even when it earns zero economic profit.
- Explain the meaning of loss as negative economic profit arising when total revenue is less than total cost.
- Calculate different profit levels from a set of data and/or diagrams.
- Explain the goal of **profit maximization** where the difference between total revenue and total cost is maximized or where marginal revenue equals marginal cost.

Subject vocabulary

opportunity cost the next best alternative forgone

self-owned resource an input into the production process that is owned by the firm or entrepreneur, such as time. It is an implicit cost of production the value of which is its opportunity cost.

entrepreneur an individual who, in pursuit of profit, brings together the other factors of production in order to produce a good or service

continued on page 75

What is economic profit?

Economic profit is the difference between **total revenue** ($TR = P \times Q$) and economic costs (explicit + implicit costs).

Therefore economic profit = $(P \times Q) - \text{explicit costs} - \text{implicit costs}$.

The meanings of explicit and implicit costs are discussed in detail on pages 66–7. Explicit costs are the **accounting costs**. They are the costs of the **purchased resources** such as **raw materials**. Implicit costs are the **opportunity costs** of the **self-owned resources** such as the time of the **entrepreneur**.

A firm makes an economic profit when total revenue is greater than economic costs (when $(P \times Q) > \text{explicit costs} + \text{implicit costs}$). If economic costs are greater than total revenue the firm earns negative economic profit (a loss). In this situation the firm's **resources** earn less economic profit than they could earn if used to produce the next-best alternative. The firm will consider doing something else with its resources. The entrepreneur might consider saving on the costs involved in operating the business by leaving the industry.

Why does a firm continue to operate when economic profit is zero?

Economists subtract explicit costs and implicit costs from total revenue to work out economic profit. So if a profit is made all costs are covered including the opportunity costs of the self-owned resources. When economic profit is zero ($TR = \text{economic costs}$) the entrepreneur continues to run the business because the purchased resources and the self-owned resources are earning profit that is equal to that which could be earned if the resources were put to the next best alternative use. When economic profit is zero there is no incentive for the entrepreneur to reallocate the resources to the production of a different good.

What is the distinction between normal and abnormal profit?

Model sentence: An economic profit of zero is called **normal profit**. It occurs when revenue = the explicit costs + implicit costs. An economic profit that is greater than zero is called **abnormal or supernormal profit**.

Abnormal profit is earned when total revenue is greater than the economic costs. Firms aim to earn as much profit as possible. However, in competitive markets where lots of firms make similar goods there is much price competition and abnormal profits tend to be driven down towards normal profit.

What is the difference between economic profit and accounting profit?

Accountants do not consider implicit costs when calculating profit. **Accounting profit** = total revenue – explicit costs (the cost of the purchased resources). No account is taken of the opportunity costs of the self-owned resources. Accounting profit is greater than economic profit. (Whenever the word ‘profit’ is mentioned from now onwards it refers to ‘economic profit’ unless stated otherwise.)

Output	TR (\$)	MR (\$)	TC (\$)	MC (\$)	Profit (\$)
1	500		1000		–500
		500		200	
2	1000		1200		–200
		500		300	
3	1500		1500		0
		500		400	
4	2000		1900		100
		500		500	
5	2500		2400		100
		500		600	
6	3000		3000		0
		500		700	
7	3500		3700		–200

Table 27.1

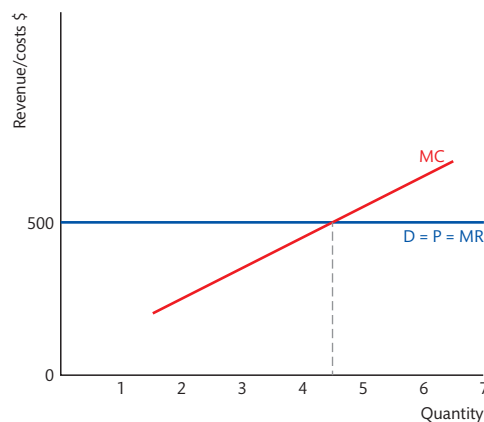


Figure 27.1

In the example set out in Table 27.1 the firm is in a very competitive industry. It faces a **perfectly elastic demand** curve with respect to price and can sell all it can make at the market price of \$500. Total revenue = $P \times Q$. Each time an extra unit is sold total revenue increases by the price. **Marginal revenue** (MR) = $\Delta TR / \Delta Q$ = $500/1 = \$500$ so price = MR . Total cost = explicit + implicit costs. Marginal cost (MC) = $\Delta TC / \Delta Q$ and these are given. Profit = $TR - TC$.

Profit is maximized when the difference between TR and TC is maximized. This is between 4 and 5 units of **output**. At this level of output $MR = \$500$ and $MC = \$500$ so we know that profit is maximized at the level of output where marginal revenue = **marginal cost**. The information on MR and MC has been plotted on to the graph in Figure 27.1. The profit, maximizing level of output is where the marginal cost curve and the marginal revenue curve **intersect**. The firm's objective is to maximize profit and therefore it sets output where $MR = MC$.

Subject vocabulary

resources the inputs into the production process, the factors of production

normal profit occurs when economic profit is equal to zero, i.e., when the difference between total revenue and total costs (explicit and implicit costs) equals zero

abnormal/supernormal profit occurs when economic profit is greater than zero, i.e., when total revenue is greater than total cost (explicit and implicit costs)

accounting profit the difference between total revenue and the explicit costs (costs of the purchased resources)

perfectly elastic demand at a particular price quantity demanded is infinite but falls to nothing as price changes. The absolute value of PED is equal to infinity.

marginal revenue the additional revenue generated from the sale of the additional unit of output produced

output the quantity of goods produced by a firm, industry or economy

marginal cost the change in total cost resulting from a change in output of one unit

Glossary

intersect cut across or through

Subject vocabulary

average revenue revenue per unit of output (= total revenue/output)

negative economic profit occurs when total cost (explicit cost + implicit cost) is greater than total revenue

short run a period of time when at least one factor is variable and the others are fixed

long run a conceptual moment in time when all factors are variable

economic model a simplified representation of complex economic reality, used to show how something works or predict what will happen

market where buyers and sellers meet to exchange money for goods and services

market demand the sum of the demand of the individual consumers in the market

Why the profit-maximizing level of output is where $MR = MC$ – a step-by-step guide

Trouble shooter

If the addition to total revenue the firm receives from selling the next unit (MR) is greater than the addition to the total cost of producing it (MC) then producing and selling the next unit adds to profit. If the addition to total cost of producing the next unit (MC) is greater than the addition to total revenue then producing the next unit reduces profit. Therefore the firm maximizes profit by producing at the level of output where $MR = MC$.

In Table 27.1 when the firm increases output from 2 to 3 units the $MR = \$500$ and the $MC = \$300$. $MR > MC$. Producing the unit adds \$200 to profit ($500 - 300$). When output is increased from 5 to 6 units $MR = \$500$ and $MC = 600$. $MC > MR$ so producing this unit reduces profit by \$100.

Model sentence: If $MR > MC$ increasing output increases profit, if $MC > MR$ reducing output increases profit therefore profit is maximized where $MR = MC$.

Test your understanding of this unit by answering the following questions

- Distinguish between normal and abnormal profit.
- Explain why profit is maximized where $MR = MC$.
- Explain why a firm will continue to operate even when it earns zero economic profit.

Learning Outcomes

- Describe, using examples, the assumed characteristics of perfect competition: a large number of firms; a homogeneous product; freedom of entry and exit; perfect information; perfect resource mobility.
- Explain, using a diagram, the shape of the perfectly competitive firm's average revenue and marginal revenue curves, indicating that the assumptions of perfect competition imply that each firm is a price taker.
- Explain, using a diagram, that the perfectly competitive firm's **average revenue** and marginal revenue curves are derived from market equilibrium for the industry.
- Explain, using diagrams, that it is possible for a perfectly competitive firm to make economic profit (supernormal profit), normal profit, or **negative economic profit** in the **short run** based on the marginal cost and marginal revenue profit maximization rule.
- Explain, using a diagram, why, in the **long run**, a perfectly competitive firm will make normal profit.
- Explain, using a diagram, how a perfectly competitive market will move from short-run equilibrium to long-run equilibrium.

Subject vocabulary

market forces the forces of demand and supply that interact in a competitive market and determine equilibrium price

homogeneous goods goods that are exactly the same

branding the process of creating a distinct logo, name, and image for a good in order to make it different from other goods in the market

perfect substitute an identical good that can immediately be used in place of another

Perfect competition is an **economic model** used to predict outcomes of economic occurrences in highly competitive industries. The characteristics or features of this type of **market** are very precise and taken as a whole the characteristics are not shared by industries in the real world. It is a model that can be used to judge the competitiveness of actual industries. The assumed characteristics have consequences.

Describe the characteristics of perfect competition and their effects – a step-by-step guide (the characteristics are in bold italics)

Trouble shooter

There are many firms and buyers in the market: no buyer or firm is big enough to be able to influence **market demand** or market supply and thereby influence market price. Firms and buyers are price takers. They take the price that is determined by **market forces**. Firms cannot get together and agree a price or output level because there are too many of them.

The firms in the industry produce homogeneous goods: there is no **marketing** or **branding**. The goods are **perfect substitutes**. The buyers in the market therefore have no preference as to which firm they buy from.

Firms and buyers have perfect knowledge: buyers and firms know the prices charged by every firm in the market and entrepreneurs know the profits being made in that particular industry and in other perfectly competitive industries. If a firm sets a price higher than the market price all buyers will know that they can pay a lower price for an identical good. Remember economists assume that consumers aim to maximize **benefit** with their **income** and therefore will buy the good at the lowest price. **Quantity demanded** for the firm with the higher price falls to zero.

The industry has no barriers to entry or to exit: existing firms in an industry cannot stop new firms entering and existing firms can exit the industry and go to another.

All the factors of production are perfectly mobile: factors can be put to an alternative use instantly therefore profit from the use of the factors can be immediately maximized. Entrepreneurs know the profits being made in that particular industry and in other perfectly competitive industries, there are no barriers to entry and factors are perfectly mobile, therefore firms simply move into markets where profit is highest. The implicit **assumption** is that firms aim to maximize profit.

Describe marginal revenue (MR) and average revenue (AR) under perfect competition

Market supply and market demand under perfect competition obey the **law of demand** and the **law of supply**.

Price is determined by the **forces of demand and supply** in the industry. There are so many firms that no individual firm's output can influence market supply and so cannot affect market price. The firm takes the market price. The industry demand and supply diagram is shown in Figure 28.1a.

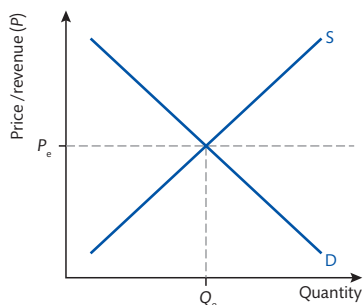


Figure 28.1a

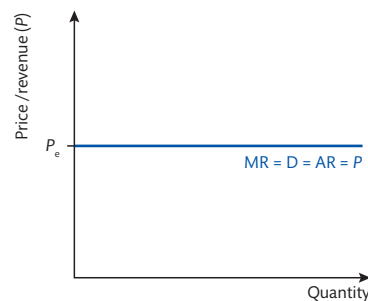


Figure 28.1b

The **equilibrium price** P_e is taken by the firm in the industry. The firm is able to sell all its **output** at P_e . Firms produce homogeneous goods and buyers have perfect knowledge so know all prices in the industry. If the firm increases price all buyers simply buy an identical good from another supplier and the quantity demanded from the firm falls to zero. Therefore **price elasticity of demand** is infinity and the **demand curve** is perfectly elastic with respect to price (see pages 19–21 for a detailed explanation of PED).

A reminder of why average revenue = price:

$TR = P \times Q$, $AR = TR/Q$, substitute TR for $P \times Q$, $AR = P \times Q/Q$, divide Q by Q , $AR = P$.

Assume $P_e = \$10$. The firm sells each extra unit of output at the same price therefore an increase in output of 1 unit leads to a change in total revenue of \$10: $MR = \Delta TR/\Delta Q = 10/1 = \$10 = P = AR$.

Price, marginal revenue, and average revenue remain constant as the output of the firm is increased. Therefore when plotted on a graph they are represented by a horizontal line as seen in Figure 28.1b: price = demand = marginal revenue = average revenue.

Distinguish between profit in the short run and in the long run under perfect competition

In the short run firms cannot change the amounts of the fixed factors they employ, new firms cannot enter the industry and existing firms are not able to exit. Therefore price in the short run is determined by consumer demand and the supply of the existing firms in the industry.

Subject vocabulary

benefit the satisfaction gained from the consumption of a good

income the payment received by the factors of production (e.g. wages paid to labour, rent paid to the owners of land)

quantity demanded the amount of a good consumers are willing and able to buy at a given price over a given period of time

barriers to entry factors that prevent/make difficult the entry of new firms into an industry or market

factors of production the inputs into the production process (land, labour, capital and entrepreneurship)

law of demand states that there is a negative causal relationship between price and quantity demanded. As price rises quantity demanded falls.

law of supply states that there is a positive causal relationship between price and quantity supplied. As price rises quantity supplied rises.

forces of demand and supply changes in the determinants of demand and supply in a market that affect the market price and the allocation of resources

equilibrium price the price at which the quantity consumers are willing and able to buy is equal to the quantity firms are willing and able to produce

output the quantity of goods produced by a firm, industry or economy

price elasticity of demand (PED) a measure of how quantity demanded responds to a change in price in percentage terms

demand curve a graph that shows the relationship between price and quantity demanded

Glossary

marketing advertising and promotion

assumption(s) something thought/believed to be true but without proof

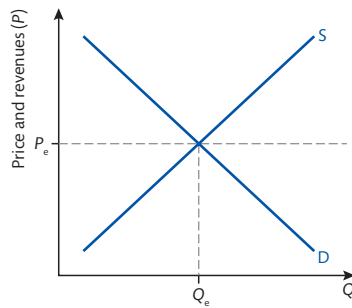


Figure 28.2a

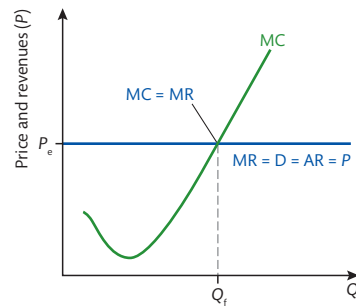


Figure 28.2b

As shown in Figure 28.2b the firm's **marginal cost** curve has been included. Profit is maximized where $MR = MC$ so the firm sets output at Q_f where the firm's MC curve **intersects** its MR curve (see page 76 for a detailed explanation of the profit maximizing rule).

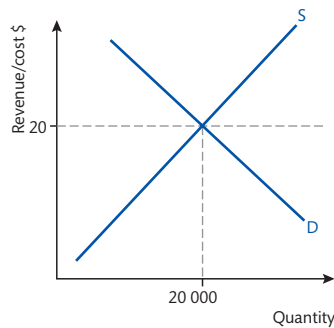


Figure 28.3a

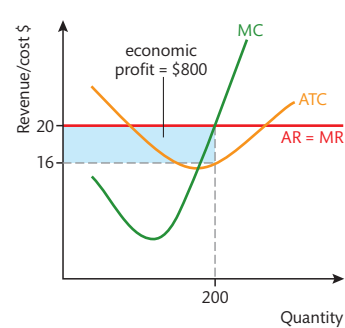


Figure 28.3b

Figure 28.3a shows a market in equilibrium in the **short run**. The firm takes the market price \$20. The firm's ATC curve has been included in Figure 28.3b. It is U-shaped and intersects the firm's MC curve at ATC's lowest point (see pages 68–9 for a detailed explanation of the shape of the ATC and its relationship with MC).

The firm maximizes profit by setting output at 200 units where $MR = MC$. **Normal profit** is earned when **economic profit** = zero. This occurs when revenue or price per unit (AR) equals total cost per unit (ATC). At this point the firm's **explicit costs** and **implicit costs** are just covered (see pages 74–5 for a detailed discussion on profit).

Economic profit greater than zero is called **abnormal profit**. In Figure 28.3b price = \$20 and the average total cost (ATC) = \$16. Price > ATC therefore the firm is more than covering the explicit and implicit costs, earning **positive economic profit** or abnormal profit of \$4 on each unit sold. Total abnormal profit, represented by the shaded area = $(P - ATC) \times \text{quantity} = (\$20 - \$16) \times 200 \text{ units} = \$4 \times 200 = \$800$.

In the **long run** firms can change the amount of their factors of production and new firms can enter the market. Existing firms earning positive economic profit increase the amount of fixed factors employed and new firms, attracted by the abnormal profits, enter the industry causing the market supply curve to shift to the right as shown in Figure 28.4a. (Remember firms have perfect knowledge so they know the size of profits in the industry, all their factors are perfectly mobile and there are no barriers to entry.)

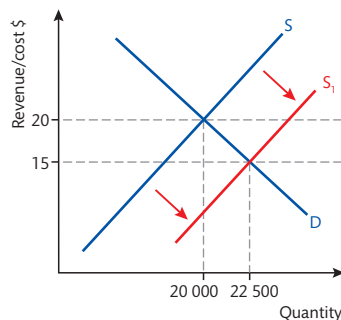


Figure 28.4a

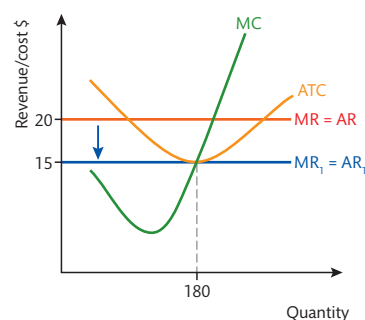


Figure 28.4b

Subject vocabulary

marginal cost the change in total cost resulting from a change in output of one unit

short run a period of time when at least one factor is variable and the others are fixed

normal profit occurs when economic profit is equal to zero, i.e., when the difference between total revenue and total costs (explicit and implicit costs) equals zero

economic profit the difference between total revenue (price \times quantity sold) and economic costs (explicit costs + implicit costs)

explicit cost payments made by firms for inputs such as wages, rent and payments for raw materials

implicit cost the opportunity cost of using resources which are self-owned and not purchased

abnormal/supernormal profit occurs when economic profit is greater than zero, i.e., when total revenue is greater than total cost (explicit and implicit costs)

positive economic profit occurs when the difference between total revenue and total costs (explicit and implicit costs) is greater than zero

long run a conceptual moment in time when all factors are variable

Glossary

intersect cut across or through

To **eliminate** the **excess supply** at \$20 the price falls. The **market clears** at \$15. The firm takes the new equilibrium price. Price and marginal revenue fall from \$20 to \$15. The profit-maximizing level of output falls from 200 units to 180 units. The firm's **market share** is smaller because more firms are now in the industry.

At an output of 180 units price = ATC. The firm now earns normal profit. In the short run the firm can earn abnormal profit but in the long run price and profit are driven down through increased market supply. Abnormal or positive economic profit can only be earned in the short run.

Negative economic profit in the short run and long run under perfect competition

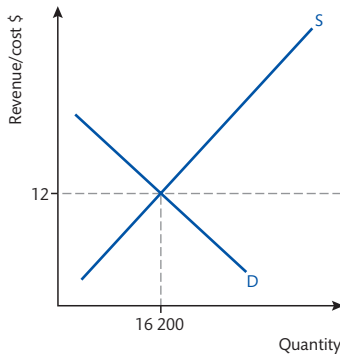


Figure 28.5a

The market price is \$12 as shown in Figure 28.5a.

The firm sets output at 180 units where $MR = MC$. Price = \$12 and $ATC = \$16$.

$ATC > P$ therefore the firm is not covering its explicit and implicit cost. Economic profit is negative so a loss per unit is made. Total economic loss, represented by the shaded area = $(P - ATC) \times \text{quantity} = (\$12 - \$16) \times 180 \text{ units} = -\$4 \times 180 = -\$720$.

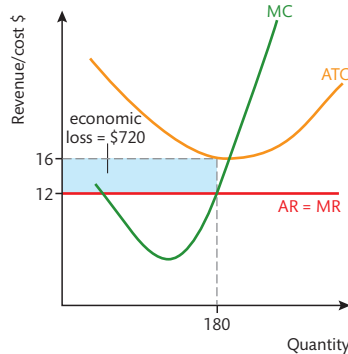


Figure 28.5b

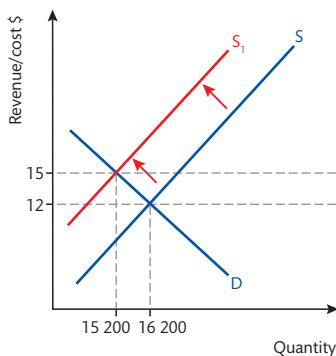


Figure 28.6a

In the long run some firms leave the market to try to earn at least normal profit in another industry. As firms leave market supply falls and the **supply curve** shifts to the left from S to S_1 as shown in Figure 28.6a. Equilibrium price, the price the firm takes, rises to \$16 and the firm's market share rises to 190. Price now equals ATC so economic profit = 0. In the long run **negative economic profit** is eliminated and normal profits are earned.

The long-run equilibrium under perfect competition is where $P = AR = MR = ATC = MC$.

Model sentence: In the long run firms enter the industry when economic profit is positive and some existing firms exit when economic profit is negative thereby altering market supply until $P = ATC$ and restoring the long-run position under perfect competition where only normal profit is made.

Synonyms

eliminate remove/
get rid of

Subject vocabulary

excess supply occurs when quantity supplied is greater than quantity demanded

market clears when quantity demanded equals quantity supplied and there is no surplus or shortage

market share the proportion of the market supply of a good or service that is controlled by a firm

supply curve a graph that shows the relationship between price and quantity supplied

negative economic profit occurs when total cost (explicit cost + implicit cost) is greater than total revenue

Subject vocabulary

marginal cost the change in total cost resulting from a change in output of one unit

price the amount of money a consumer pays a producer in exchange for a good

Glossary

shut down stop operating

assumption(s) something thought/believed to be true but without proof

exceed(s) are/is greater than

Why does the marginal cost curve act as the firm's supply curve?

If the price the firm receives from the sale of the next unit produced is less than the **marginal cost** (the cost of producing that next unit) the firm would make a loss on that extra unit and will therefore not supply it. The firm must receive a price that is at least equal to the marginal cost if it is to supply an extra unit. The marginal cost curve therefore shows the minimum price the firm must be paid if it is to supply an additional unit of output. The supply curve and the marginal cost curve both show the quantity of goods a firm or an industry is willing to supply at each price therefore they are the same: $S = MC$.

Test your understanding of this unit by answering the following questions

- Using diagrams to illustrate your answer, explain why under perfect competition a firm's economic profit equals zero in the long run.

Learning Outcomes

- Distinguish between the short-run **shut-down price** and the break-even price.
- Explain, using a diagram, when a loss-making firm would shut down and exit the market in the long run.
- Calculate the short-run shutdown price and the breakeven price from a set of data.

Subject vocabulary

perfect competition a theoretical market structure which has the required characteristics that ensures no buyer or seller has the power to be able to influence market price

industry a group of firms that produce the same or similar goods or services

profit/economic profit the difference between total revenue (price \times quantity sold) and economic costs (explicit costs + implicit costs)

output the quantity of goods produced by a firm, industry or economy

total fixed cost the sum of the costs that do not change as output changes

average total cost is equal to total cost divided by quantity of output

total revenue price \times quantity sold

explicit cost payments made by firms for inputs such as wages, rent, and payments for raw materials

implicit cost the opportunity cost of using resources which are self-owned and not purchased

Explain when a loss-making firm would shut down in the short run

Under **perfect competition** when a firm is making a loss it might choose to leave the **industry**. Some firms may decide to stay if they believe price will soon increase so that $P = ATC$ once again and normal profit is restored. Set out below is an explanation of the shut-down rule. It is based on the **assumption** that a firm's objective is to maximize **profit** or minimize loss. A loss can be described as a negative profit. Therefore, in effect, minimizing loss is the same as maximizing profit. In the short run the quantity of at least one of the factors is fixed and the others are variable. Therefore even when the firm is not producing any **output** it must pay the costs related to the fixed factors. These are the **total fixed costs** and they are the minimum cost the firm must pay in the short run. Therefore if the firm stops producing the loss will be only the fixed costs. The loss will increase if the firm continues to produce when the price per unit is less than the average variable cost at all levels of output.

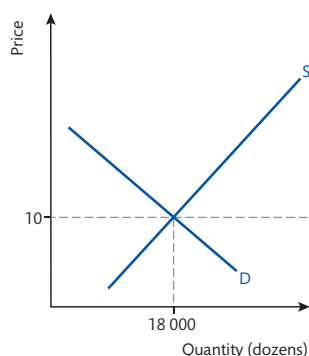


Figure 29.1a

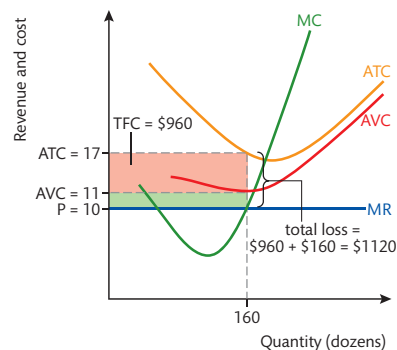


Figure 29.1b

As shown in Figures 29.1a and b, the market price of \$10 taken by the firm is determined in the market. The average variable cost curve has been included on the diagram. It can be seen that at all levels of output **average total cost** and average variable cost **exceed** price. To maximize profit or minimize loss the firm sets output where $MR = MC$ (see trouble shooter on page 76 for a detailed explanation of profit-maximization point). At an output of 160 units $ATC = \$17$ and $AVC = \$11$.

Calculation of total loss made by the firm when it continues to produce

Economic profit = **total revenue** ($P \times Q$) – total cost (**explicit costs** + **implicit costs**) ($ATC \times Q$)

Economic profit = $\$10 \times 160 - \$17 \times 160 = \$1600 - \$2720 = -\$1120$ (represented by the two shaded areas in Figure 29.1b)

Calculation of the loss made when the firm shuts down in the short run

The minimum cost the firm must pay in the short run are the fixed costs. This is the cost incurred at zero output. To calculate this cost AFC must be isolated.

$ATC = AFC + AVC$ subtract AVC from both sides

$ATC - AVC = AFC$

$AFC = \$17 - \$11 = \$6$

$TFC = AFC \times Q = \$6 \times 160 = \960

Total revenue and total variable cost if the firm shuts down = 0

$\text{Profit} = TR - TC = 0 - \$960 = -\$960$ (represented by the larger of the shaded areas)

Calculation of the additional loss caused by the firm continuing to produce

$TVC = AVC \times q$

$TVC = \$11 \times 160 = \1760

$TR = p \times q = \$10 \times 160 = \1600

Loss caused by the production of the 160 units = $TR - TVC = \$1600 - \$1760 = \$160$ (represented by the smaller of the shaded areas)

Why does the firm shut down when average variable cost is greater than the price?

The variable cost per unit is greater than price at all levels of output. Therefore every time the firm makes a unit of output it adds to the loss. As can be seen in the calculation above the firm can reduce total loss by \$160 if it stops producing, limiting the loss to \$960 which is the total fixed costs. The goal of the firm is to maximize profit or to minimize loss therefore in this position the firm shuts down in the short run.

Model sentence: A firm shuts down production in the short run when the loss from stopping production is less than the loss from producing at any level of output; that is when average variable cost at any level of output is greater than price.

If price = **average variable cost** then total revenue = **total variable cost**. The firm is just covering the variable costs. The firm's loss is only the fixed costs. In this position the firm might continue to produce in the short run. By doing so it continues to serve its customers and employ its workers and will be able to benefit if the market price increases.

If price is greater than AVC then $TR > TVC$. Each unit of output can make a contribution to covering some of the fixed costs. The firm will continue to produce because it makes less of a loss than it would if it closed down.

Explain why a firm would leave the market in the long run

A firm cannot continue to make a loss **indefinitely**. In the **long run** all factors are variable so the firm can develop strategies designed to reduce average total cost so it is covered by the price. For example, the firm can increase the scale of production, opening new factories and increasing the amount of capital. By doing so the firm experiences **economies of scale** and average total cost might fall enough so that it equals price. (See pages 69, 70 and 71 for a detailed explanation of costs in the long run.)

When price = average total cost, all costs, which include explicit costs and implicit costs are covered. This means that the **purchased resources** and the **self-owned resources** will be earning at least as much as they could if put to use producing the next best alternative. When price = ATC **economic profit** is zero and the firm is earning **normal profit** (see pages 74–5 for a detailed explanation of economic profit). In this situation the firm has no **incentive** to leave the industry. If price is less than ATC the firm is not covering its costs including the **opportunity cost** and therefore will exit the industry. The **break-even price** is the price required to keep the firm in the industry in the long run. It is the price that is equal to the average total cost.

Model sentence: When average total cost is greater than price the firm earns negative economic profit. It can increase profit by reallocating its factors. So if price does not cover average total cost in the long run the firm will shut down.

Subject vocabulary

average variable cost is equal to total variable cost divided by quantity of output

total variable cost the sum of the costs that change as output changes

long run a conceptual moment in time when all factors are variable

economies of scale the cost advantages gained by a firm from increasing the scale of its production. Average cost falls in the long run as the size of a firm's operation increases.

purchased resources an input into the production process that is bought by the firm or the entrepreneur from an individual or another firm

self-owned resource an input into the production process that is owned by the firm or entrepreneur, such as time. It is an implicit cost of production the value of which is its opportunity cost.

economic profit the difference between total revenue (price \times quantity sold) and economic costs (explicit costs + implicit costs)

normal profit occurs when economic profit is equal to zero, i.e., when the difference between total revenue and total costs (explicit and implicit costs) equals zero

opportunity cost the next best alternative forgone

break-even price the price at which the firm makes normal profit

Glossary

indefinitely not having a known/clear end point

Synonyms

incentive... encouragement/motivation

The rules that profit-maximizing firms follow – a step-by-step guide

Trouble shooter

In the short run: the firm should only produce output if the price it receives is greater than the average variable cost.

In the long run: the firm should only produce output if it earns at least a normal profit. In other words if price is equal to or greater than average total cost.

In the short and long run: the firm should set the level of output where marginal revenue is equal to marginal cost if it has made the decision to continue production.

Test your understanding of this unit by answering the following questions

- Explain, using a diagram, when a loss-making firm would shut down in the short run.
- Explain, using a diagram, when a loss-making firm would shut down and exit the market in the long run.
- Using the following information calculate the economic profit or loss: $P = \$20$, $MC = \$16$, $ATC = \$22$, $AVC = \$18$, quantity = 50 units. (MC, ATC, and AVC include both explicit and implicit costs).

Subject vocabulary

short run a period of time in which the quantity of at least one factor is fixed

Learning Outcomes

- Explain the meaning of the term allocative efficiency.
- Explain that the condition for allocative efficiency is $P = MC$.
- Explain, using a diagram, why a perfectly competitive market leads to allocative efficiency in both the **short run** and the **long run**.
- Explain the meaning of the term productive/technical efficiency.
- Explain that the condition for **productive efficiency** is that production takes place at minimum average total cost.
- Explain, using a diagram, why a perfectly competitive firm will be productively efficient in the long run, though not necessarily in the short run.

Subject vocabulary

long run a conceptual moment in time when all factors are variable

productive efficiency occurs when a given quantity of output is produced at the minimum total cost per unit of output

output the quantity of goods produced by a firm, industry or economy

benefit the satisfaction gained from the consumption of a good

marginal cost the change in total cost resulting from a change in output of one unit

resources the inputs into the production process, the factors of production

Synonyms

forgo sacrifice/give up

reallocate(d) ... redistribute(d)

Explain why the condition necessary for allocative efficiency is $P = MC$

As shown in Figure 30.1 the price of butter is \$6000 per tonne. This means that consumers in society place a maximum value of \$6000 on the next tonne of butter consumed. The price consumers in society are willing to pay for the additional **output** is a reflection of the **benefit** consumers receive from the consumption of it. When output is at Q_1 the **marginal cost** is \$8000. This means the price or value of the **resources** used to

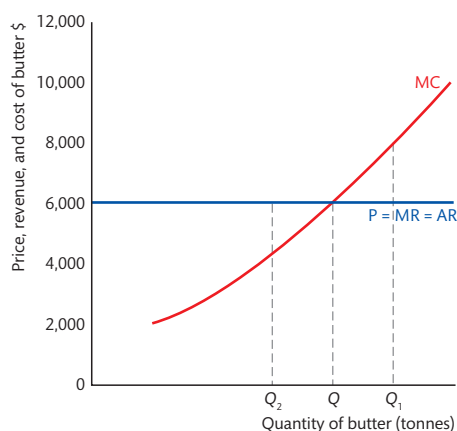


Figure 30.1

When output is at Q_2 price is \$6000 and marginal cost is \$4500. This means that the value society places on the consumption of the additional tonne of butter is greater than the value of the resources used to produce it. In

produce the additional tonne of butter is greater than the value consumers in society place on the consumption of it. In other words price is less than marginal cost. In order to enjoy the benefit of consuming the additional output valued at \$6000 society must use resources valued at \$8000. By using the resources valued at \$8000 to produce the additional tonne of butter consumers in society **forgo** the benefit they would have enjoyed from the consumption of the alternative goods that could have been produced with the resources. In this situation the welfare of consumers can be increased if the resources used to produce the additional tonne of butter are **reallocated** and used to produce alternative goods.

other words price is greater than marginal cost. In this situation society's welfare can be increased if resources used to produce other goods are reallocated and used to produce more butter instead.

When output is at Q price is \$6000 and marginal cost is \$6000. This means that the value society places on the additional tonne of butter equals the value of the resources used to produce it. In other words price equals marginal cost. Allocative efficiency is realized when the value society places on the additional tonne of butter is equal to the value of the resources used to produce it ($P = MC$). This means the value society places on the additional tonne is equal to the value of the next best alternative use of the resources, which is the **opportunity cost** of the production of the additional tonne of butter.

Maximization of society's welfare and allocative efficiency

Model sentence: When $P < MC$ the value society places on the consumption of the additional unit is less than the value of the resources used to produce it therefore society's welfare can be increased by reallocating resources away from the production of the good to the production of alternatives in order to reduce output.

Model sentence: When $P > MC$ the value society places on the consumption of the additional unit is greater than the value of the resources used to produce it therefore welfare can be increased by reallocating resources away from the production of other goods to the production of the good in order to increase output.

Model sentence: When $P = MC$ the value society places on the consumption of the additional unit is equal to the value of the resources used to produce it, therefore society's welfare cannot be increased by the reallocation of resources and allocative efficiency is realized.

Allocative efficiency occurs when price = marginal cost. Society's welfare is maximized. Any reallocation of resources will reduce society's welfare.

Explain why a perfectly competitive market leads to allocative efficiency in both the short run and the long run – a step-by-step guide (see pages 76–9 for a full explanation of short run and long-run equilibrium under perfect competition)

Trouble shooter

The objective of all firms, in the short and long run, is to maximize profit.

Therefore they set output where $MR = MC$ (see page 76 for an explanation of profit maximization).

Under **perfect competition** the firm's **marginal revenue** is equal to price.

Therefore at profit-maximizing level of output price = marginal revenue = marginal cost.

Therefore allocative efficiency is achieved under perfect competition in the short run and the long run.

Model sentence: The **equalization** of price and marginal cost, which is the condition necessary for an efficient allocation of society's resources, is the direct result of the profit maximizing behaviour of price-taking firms under perfect competition where the firms' marginal revenue is equal to price.

Distinguish between productive efficiency and technical efficiency

A firm is being productively efficient when it is combining factors in such a way as to produce output at the lowest possible **average total cost**. Technical efficiency occurs when the output from a given quantity of labour and capital is maximized. If a firm is technically efficient it cannot produce more output without increasing the quantity of labour and/or capital.

Subject vocabulary

opportunity cost the next best alternative forgone

perfect competition a theoretical market structure which has the required characteristics that ensures no buyer or seller has the power to be able to influence market price

marginal revenue the additional revenue generated from the sale of the additional unit of output produced

average total cost is equal to total cost divided by quantity of output

Glossary

equalization the act of making equal/the same

Subject vocabulary

perfect competition a theoretical market structure which has the required characteristics that ensures no buyer or seller has the power to be able to influence market price

positive economic profit occurs when the difference between total revenue and total costs (explicit and implicit costs) is greater than zero

allocative efficiency the best or optimal allocation of resources from society's point of view. It occurs when the market is in equilibrium and social surplus is maximized (where $P = MC$).

abnormal/supernormal profit occurs when economic profit is greater than zero, i.e., when total revenue is greater than total cost (explicit and implicit costs)

industry a group of firms that produce the same or similar goods or services

supply the amount of a good that a firm is willing and able to produce at each price

market supply the sum of the supply of the individual firms in the industry

equilibrium price the price at which the quantity consumers are willing and able to buy is equal to the quantity firms are willing and able to produce

market price the price determined by the interaction of demand and supply in a competitive market

normal profit occurs when economic profit is equal to zero, i.e., when the difference between total revenue and total costs (explicit and implicit costs) equals zero

break even occurs when a firm makes normal profit. All costs, explicit and implicit, are just covered.

Productive efficiency in the short run and the long run

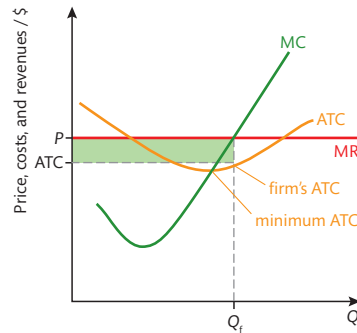


Figure 30.2

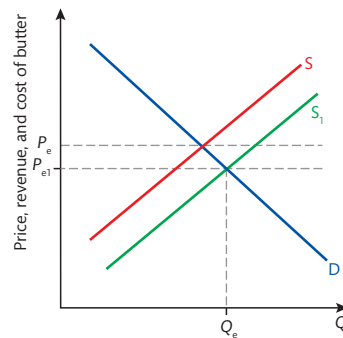


Figure 30.3a

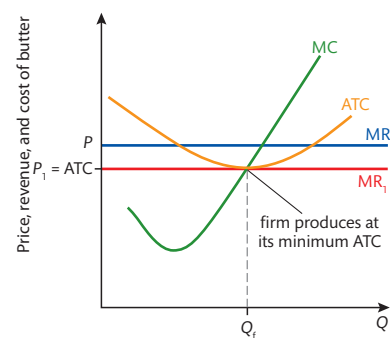


Figure 30.3b

In the long run, attracted by the abnormal profit, new firms enter the **industry** and **supply** increases. As shown in Figure 30.3a the **market supply** curve shifts to the right from S to S_1 and **equilibrium price** falls from P_e to P_1 . The firm takes the **market price** so the price the firm receives falls from P to P_1 until price equals average total cost and **normal profit** is earned.

More firms are now in the industry, increasing competition and driving price and profit down. In order to earn at least normal profit and **break even** the firm must reduce average total costs. Profit is now maximized at a lower level of output so the firm reduces output to where $MR = MC$. The long-run equilibrium, $P = MR = ATC = MC$, is restored.

The outcomes of the long-run equilibrium $P = AR = MR = ATC = MC$ under perfect competition – a step-by-step guide

Trouble shooter

$MR = MC$ therefore the firm is maximizing profit.

$P (AR) = MC$ therefore allocative efficiency is achieved.

$MC = ATC$ therefore productive efficiency is achieved (remember MC intersects ATC at ATC 's lowest point).

$P (AR) = ATC$ therefore normal profits are earned and the firm breaks even.

Test your understanding of this unit by answering the following questions

- Using a diagram to illustrate your answer, explain how productive efficiency is achieved in the long run under perfect competition.
- Why does reducing output when price is less than marginal cost increase society's welfare?
- Explain why under perfect competition allocative efficiency is achieved in both the short run and the long run.

Learning Outcomes

- Describe, using examples, the assumed characteristics of a monopoly: a single or **dominant** firm in the market; no close substitutes; significant barriers to entry.
- Describe, using examples, barriers to entry, including economies of scale, branding, and legal barriers.
- Explain that the average revenue curve for a monopolist is the market demand curve, which will be downward sloping.
- Explain, using a diagram, the relationship between demand, average revenue, and marginal revenue in a monopoly.
- Explain why a monopolist will never choose to operate on the inelastic **portion** of its average revenue curve.

Under perfect competition firms have no **market power**. There are very many firms that make up the industry all making **homogeneous goods** so consumers can choose from which firm they buy. They cannot influence **market supply** and are unable to affect the price. Firms are price takers. There are no **barriers to entry** to the industry so new firms can enter when positive economic profits are earned, increasing market supply and driving down price and profit. The assumed characteristics of perfect competition have consequences and this is true for all **market structures** including monopoly.

Describe the consequences of the assumed characteristics of monopoly – a step-by-step guide

Trouble shooter

The firm is the industry in the case of a pure monopoly (the term 'monopoly' is also used to describe an industry that has one dominant firm).

The firm is the single seller in the market.

It is the only firm producing the good, therefore there are no close substitutes available for consumers to buy.

The firm therefore has the **monopoly power** to set the price of the good, and because of this the **monopolist** is called a price maker.

If abnormal profits are made at the set price the monopolist is able to protect them because there are many and high barriers to entry into the industry.

Potential new firms attracted by the high profits available will find it difficult, if not impossible, to enter the industry.

The monopolist therefore holds onto its market power to control price and can continue to earn abnormal profit, not only in the short run but also in the long run.

Barriers to entry

Without the barriers to entry a monopolist would not be able to maintain its power to set price and earn abnormal profit. Firms in the industry can put up artificial barriers that stop competitors entering the industry. Other barriers – called natural barriers – exist because of the high costs new firms must pay in order to compete against large firms and the fact that the large firms can produce at relatively low average cost.

Natural barriers

The monopolist enjoys **economies of scale** (see pages 69–71 for a detailed explanation of economies of scale). These are the cost advantages of producing on a large scale. A potential new entrant is likely to be comparatively small and will not enjoy the same economies of scale as the incumbent therefore its **average total cost** will be higher and it will not be able to compete. The firm will not be able to make a normal profit at the established price because its average total cost will be higher than the price. Potential new entrants know that they will struggle to compete with the incumbent so do not enter the industry. **Start-up costs** are very high. To enter such an industry requires a lot of money, much of which could be lost if the business fails. Capital is often specialized and expensive and gaining market share will require a major international **marketing**

Synonyms

dominant.....main/leading

portion.....part

Subject vocabulary

market power the ability of a firm to change the market price of a good or service

homogeneous goods goods that are exactly the same

market supply the sum of the supply of the individual firms in the industry

barriers to entry factors that prevent/make difficult the entry of new firms into an industry or market

market structure the structure is determined by the characteristics of a market and it is the characteristics that affect the level of competition, prices and profit

monopoly power the degree of control a firm has over the setting of price

monopolist a firm that dominates an industry

economies of scale the cost advantages gained by a firm from increasing the scale of its production. Average cost falls in the long run as the size of a firm's operation increases.

average total cost is equal to total cost divided by quantity of output

start-up costs expenses linked to setting up a new business before it starts producing and selling goods or services

Glossary

potential possible, as opposed to actual

marketing advertising and promotion

Subject vocabulary

sunk costs a cost that has already been incurred by a firm and cannot be recovered

resources the inputs into the production process, the factors of production

raw material the basic material from which a good is made

predatory pricing occurs when a firm sets a price that is so low other firms in the industry are unable to compete and therefore leave the market

positive economic profit occurs when the difference between total revenue and total costs (explicit and implicit costs) is greater than zero

demand curve a graph that shows the relationship between price and quantity demanded

average revenue revenue per unit of output (= total revenue/output)

Synonyms

significant major/large

scarce limited/finite

extracted removed

grip hold

Glossary

mines deep holes in the ground used for removing coal, gold, etc.

government franchise the right, sometimes exclusive, to produce a good or service officially granted a firm by a government

patent a government license that gives the holder exclusive rights to a process, design, or new invention for a designated period of time. It gives a firm the right to stop another firm from making, using or selling that which has been granted a patent.

campaign. This is an example of a **sunk cost** – a cost that cannot be recovered by the firm when it exits the industry. Achieving and maintaining brand recognition is costly and in order to remain competitive once in the industry the firm will need to spend lots of money on research and development (R&D). This acts as a **significant** barrier to entry into the pharmaceutical industry for example, where high start-up costs and sunk costs increase the risk of business failure. Firms are simply not prepared to take the risk, leaving the incumbent as the sole supplier.

If the incumbents control important **scarce resources** it acts as a barrier to entry. If potential entrants are unable to obtain a resource required for production they cannot enter the industry. For example, if the monopolist owns the **mines** from which the **raw material** required in the production process is **extracted** the resource will be unavailable to other potential producers.

Artificial barriers

A monopolist may have large reserves of profit to be able to fight any immediate competition. It could buy out a rival firm. This business strategy is called predatory acquisition. The monopolist could set its price below the new firm's average total cost leaving the new firm unable to make a profit and eventually driving it out of the industry. This strategy is called **predatory pricing**. The monopolist can keep its price low in one market for relatively long periods of time if it is operating in a number of markets because it can use profit earned in one market to enable it to make losses in the other caused by its predatory pricing strategy. This is called cross-subsidization.

The monopolist can run a very costly marketing and advertising campaign in order to strengthen its brand and its **grip** on market share. These actions are deliberately taken by the incumbent to drive new firms out of the industry and to discourage potential entrants.

Legal barriers

There are legal barriers to entry. A **government franchise** gives the recipient firm the exclusive right to sell a good or service. For example, a train company might have the legal right to be the sole provider of a service on a particular route. A **patent** gives the holder the exclusive right to make a good. No other firm can legally produce and sell the good. For example a drug company obtains a patent on a new drug. The company is the sole supplier of the drug. Other firms are not legally allowed to make the drug.

Model sentence: New firms are attracted to markets that are making **positive economic profit** but are unable to enter and compete when there are high barriers to entry. Therefore the monopolist is able to maintain its power to set price and earn abnormal profit in the long run.

Why does the monopolist face a downward-sloping demand curve?

There is one firm in a monopoly. The firm is the industry. Therefore the firm's **demand curve** is the market demand curve. Consumers place a different value on the next unit consumed. Some are prepared to pay a higher price for an additional unit than others. Some consumers will only buy an additional unit when price is reduced reflecting the value they place on the additional unit. If the monopolist wishes to increase quantity sold it must reduce price and to reflect this the demand curve slopes downwards.

Model sentence: In a perfectly competitive market the firm faces a perfectly elastic demand curve as it is able to sell all its output at the market price but the monopolist's demand curve is the market demand curve and it slopes downwards. This means the monopolist must reduce price in order to increase output sold.

Describe the relationship between average revenue, marginal revenue, total revenue, and price (see pages 71–3 for a detailed explanation of the revenues (AR, MR, TR) for firms facing a downward-sloping demand curve)

Consumers buy the additional unit only if the monopolist reduces price. As previously discussed $P = AR$. When price falls **average revenue** falls. When price falls quantity demanded increases, therefore as AR falls quantity demanded increases. This means that the average revenue curve reflects the same information as the demand curve therefore the AR curve is also referred to as the demand curve.

It is assumed that the firm charges the same price on all units sold therefore the firm can only gain the revenue from the sale of the next unit if it reduces the price on all previous units.

Quantity of output (Q)	Price (P) = average revenue (AR)	Total revenue (TR)	Marginal revenue (MR)
0	450	0	–
1	400	400	400
2	350	700	300
3	300	900	200
4	250	1000	100
5	200	1000	0
6	150	900	–100
7	100	700	–200
8	50	400	–300

Table 31.1

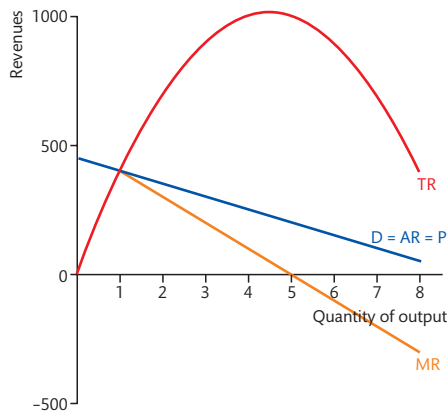


Figure 31.1

As price continues to fall and **output** increases the firm **forgoes** increasingly more revenue from the sale of the previous units while the revenue from the sale of each additional unit decreases. **Marginal revenue**, which is the change in **total revenue** from selling the next unit, therefore falls as price falls as shown in Table 31.1. If the revenue generated from the sale of the next unit is greater than the loss in revenue from the previous units marginal revenue will be positive, so producing and selling the next unit will add to total revenue. As shown in the table, reducing price in order to sell the next unit when marginal revenue is positive leads to a rise in total revenue. Marginal revenue (the change in total revenue from the sale of the next unit) becomes negative when the revenue gained from selling the next unit is less than the loss in revenue from the sale of the previous units that could have been sold at a higher price. If the change in total revenue from the sale of the next unit is negative then total revenue will fall if that unit is produced and sold. As shown in the table when marginal revenue becomes negative total revenue starts to fall. In Figure 31.2 when the marginal revenue curve becomes negative at just over 5 units the total revenue curve starts to fall. Therefore total revenue is maximized when marginal revenue = 0.

Why does a monopolist choose to operate on the elastic portion of its demand curve? (see pages 22–3 for a detailed explanation of PED, revenue, and elasticity along a demand curve)

Total revenue is maximized where marginal revenue = 0. As shown in Figure 31.2, if the firm reduces or increases output below or above 5 units total revenue falls. This is because **price elasticity of demand** (PED) varies over a range of prices along a downward-sloping, linear demand curve. Why would the monopolist not consider increasing output beyond 5 units? PED is inelastic along this section of the average revenue or demand curve.

Output (Q)	Price (P)/\$	Total revenue (TR = P × Q)/\$	Marginal revenue (MR = ΔTR/ΔQ)/\$	Average revenue (AR = TR/Q)/\$
0	–	–	–	–
1	10	10	10	10
2	9	18	8	9
3	8	24	6	8
4	7	28	4	7
5	6	30	2	6
6	5	30	0	5
7	4	28	–2	4
8	3	24	–4	3
9	2	18	–6	2
10	1	10	–8	1

Table 31.2

Subject vocabulary

output the quantity of goods produced by a firm, industry or economy

marginal revenue the additional revenue generated from the sale of the additional unit of output produced

total revenue price × quantity sold

price elasticity of demand (PED) a measure of how quantity demanded responds to a change in price in percentage terms

Synonyms

forgoes sacrifices/gives up

Subject vocabulary

quantity demanded the amount of a good consumers are willing and able to buy at a given price over a given period of time

short run a period of time when at least one factor is variable and the others are fixed

output the quantity of goods produced by a firm, industry or economy

average variable cost is equal to total variable cost divided by quantity of output

long run a conceptual moment in time when all factors are variable

normal profit occurs when economic profit is equal to zero, i.e., when the difference between total revenue and total costs (explicit and implicit costs) equals zero

average total cost is equal to total cost divided by quantity of output

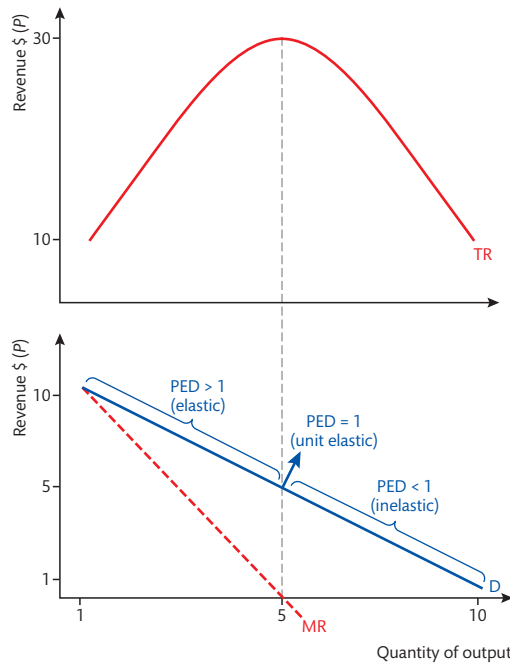


Figure 31.2

As shown in Table 31.2, reducing price from \$5 to \$4 causes quantity demanded to rise from 6 to 7.

$$PED = \frac{\Delta Q_d / Q_d}{\Delta P / P} = \frac{1/6}{-1/5} = \frac{0.166}{0.20} = (-) 0.83$$

$PED < 1$ therefore demand is price inelastic. The rate of change in the fall in price is greater than the rate of change in the increase in **quantity demanded**. Total revenue = price \times quantity therefore when PED is inelastic a fall in price will lead to a fall in total revenue.

The revenue gained from the sale of the next unit in this case is \$4. The monopolist now only gets \$4 for the 6 previous units, which is \$24, when it used to get \$5 for the 6 units, which is \$30. This is a loss in revenue of \$6. By reducing price the monopolist gains \$4 from the sale of the additional unit but loses \$6 because it has to sell the previous units at a lower price. Therefore total revenue falls by \$2 (\$4 - \$6). The monopolist is assumed to be self-interested and therefore it will not reduce price in order to increase output when marginal revenue is negative and PED is inelastic, because to do so reduces the monopolist's total revenue. The monopolist will produce where MR is positive and this is along the section of the demand curve that is price elastic.

Test your understanding of this unit by answering the following questions

- Explain why a monopolist's demand curve slopes downwards.
- Distinguish between natural barriers to entry and artificial barriers to entry.
- Using a diagram to illustrate your answer explain the shape of a monopolist's marginal revenue curve.
- Explain the relationship between price elasticity of demand and marginal revenue.

Learning Outcomes

- Explain, using a diagram, the short- and long-run equilibrium output and pricing decision of a profit-maximizing (loss-minimizing) monopolist, identifying the firm's economic profit (or losses).
- Explain the role of barriers to entry in permitting the firm to earn economic profit.
- Explain, using a diagram, the output and pricing decision of a revenue-maximizing monopoly firm.
- Compare and contrast, using a diagram, the equilibrium positions of a profit-maximizing monopoly firm and a revenue-maximizing monopoly firm.
- Calculate from a set of data and/or diagrams the revenue-maximizing level of output.

Like all firms it is assumed that the monopolist aims to maximize profit and follows the golden rules for profit maximization set out below.

Profit maximization is the objective of all firms in all industries

In the **short run**: The firm should only produce **output** if the price it receives is greater than the **average variable cost**.

In the **long run**: The firm should only produce output if it earns at least a **normal profit**. In other words if price is equal to or greater than **average total cost**.

In the short and long run: The firm should set the level of output where **marginal revenue** is equal to **marginal cost** if it has made the decision to continue production.

Profit and loss in the short run

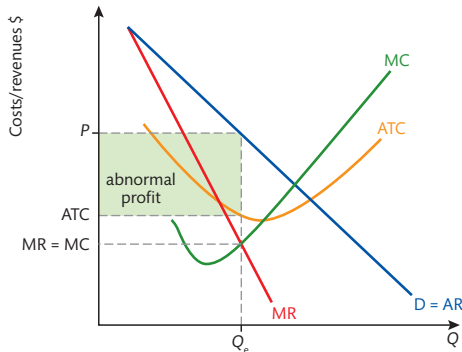


Figure 32.1

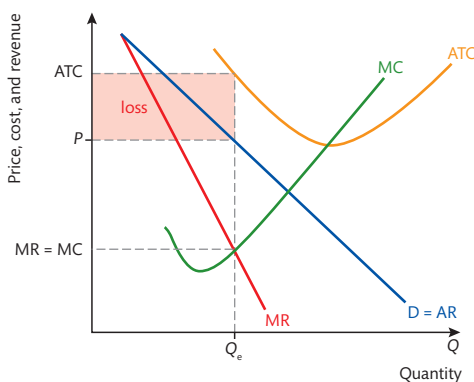


Figure 32.2

The **monopolist** sets output at the level where marginal revenue equals marginal cost in order to maximize profit (see pages 74–6 for a detailed explanation of profit maximization). As shown in Figure 32.1 profit-maximizing level of output is Q_e and the price consumers are willing to pay for this quantity, marked P on the diagram, is determined by the demand curve. When output is set at Q_e price is greater than average total cost therefore the monopolist earns **positive economic profit** or **abnormal profit** on each unit sold. The total abnormal profit earned is calculated by subtracting average total cost from price and multiplying by the quantity sold: $(P - ATC) \times Q$.

Abnormal profit is represented by the shaded area (see pages 74–6 for a detailed explanation of abnormal profit). **Barriers to entry** is an assumed characteristic of monopoly (see pages 85–6 for a full explanation of barriers to entry) and they prevent new firms entering the **industry** to compete for the abnormal profit therefore the monopolist is able to earn positive economic profits in the long run.

Figure 32.2 shows the monopolist making a loss. At the profit-maximizing level of output where marginal revenue equals marginal cost average total cost is greater than price. A loss is made on each unit sold. The total loss is the difference between ATC and price multiplied by quantity: $(ATC - P) \times Q$. Total loss is represented by the shaded area. The monopolist will continue to produce in the short run so long as the price it receives for a unit of output is greater than

average variable cost because the firm is making at least some contribution to covering **fixed costs**. In the long run the monopolist will **shut down** production if at least a normal profit cannot be earned (see pages 80–82 for a full explanation of shut-down decisions).

Model sentence: A monopolist maximizes profit by setting output where marginal revenue equals marginal cost. If price is greater than average total cost at this level of output the firm can earn positive economic profit in the long run because the high barriers to entry prevent new firms from competing and driving prices and profit down.

Distinguish between profit maximizing and revenue-maximizing – a step-by-step guide (see Figure 32.3 on page 90)

Trouble shooter

Marginal revenue is the addition to **total revenue** from producing and selling the next unit.

Therefore when marginal revenue is positive (up to Q_{revmax}) producing and selling the next unit will add to total revenue.

Beyond Q_{revmax} marginal revenue is negative therefore producing and selling output will reduce total revenue.

In order to maximize revenue the firm sets output where marginal revenue equals zero, Q_{revmax} on Figure 32.3, at price P_{revmax} . At this point total revenue is at its highest.

Subject vocabulary

marginal revenue the additional revenue generated from the sale of the additional unit of output produced

marginal cost the change in total cost resulting from a change in output of one unit

monopolist a firm that dominates an industry

positive economic profit occurs when the difference between total revenue and total costs (explicit and implicit costs) is greater than zero

abnormal/supernormal profit occurs when economic profit is greater than zero, i.e., when total revenue is greater than total cost (explicit and implicit costs)

barriers to entry factors that prevent/make difficult the entry of new firms into an industry or market

industry a group of firms that produce the same or similar goods or services

fixed cost a business cost that does not change as the quantity of goods or services the business produces changes, such as rent

total revenue price \times quantity sold

Glossary

shut down stop operating

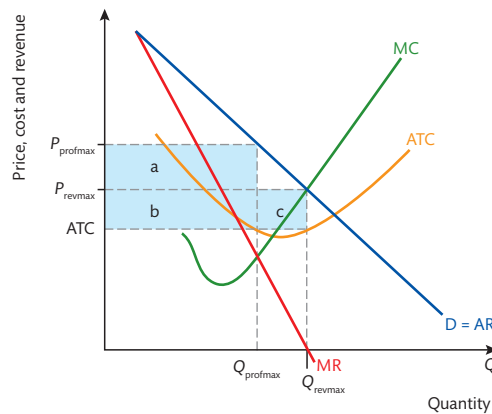


Figure 32.3

In order to maximize profit the monopolist sets output at Q_{profmax} where marginal revenue equals marginal cost. This is below revenue-maximizing level of output. Profit-maximizing price is greater than revenue maximizing price. The profit-maximizing firm produces less and charges more than if its objective is to maximize revenue. When profit maximizing the firm earns abnormal profit of $(P_{\text{profmax}} - ATC) \times Q_{\text{profmax}}$ which is represented by the areas a + b. By reducing price and increasing quantity sold to maximize revenue, the monopolist earns abnormal profit of $(P_{\text{revmax}} - ATC) \times Q_{\text{revmax}}$ which is represented by area b + c. $(P_{\text{revmax}} - ATC) \times Q_{\text{revmax}} < (P_{\text{profmax}} - ATC) \times Q_{\text{profmax}}$. The firm gains area c of profit but forgoes the larger area a, therefore profit falls.

Test your understanding of this unit by answering the following questions

- Using a diagram to illustrate your answer, explain why a monopolist can earn abnormal profit in the long run.
- Using a diagram to illustrate your answer distinguish between a profit maximizing monopolist and a revenue maximizing monopolist.

Synonyms

firm..... business/producer/
supplier

Learning Outcomes

- With reference to economies of scale, and using examples, explain the meaning of the term 'natural monopoly'.
- Draw a diagram illustrating a natural monopoly.
- Explain, using diagrams, why the profit-maximizing choices of a monopoly **firm** lead to allocative inefficiency (welfare loss) and productive inefficiency.
- Explain why, despite inefficiencies, a monopoly may be considered desirable for a variety of reasons, including the ability to finance research and development (R&D) from economic profits, the need to innovate to maintain economic profit, and the possibility of economies of scale.
- Draw diagrams and use them to compare and contrast a monopoly market with a perfectly competitive market, with reference to factors including efficiency, price and output, research and development (R&D), and economies of scale.

Subject vocabulary

continued from page 91

long run a conceptual moment in time when all factors are variable

consumer surplus the difference between the price a consumer is willing and able to pay and the price the consumer actually pays

producer surplus the difference between the price a firm is willing to accept for a unit of output and the price the consumer actually pays

real income income after taking into account the effects of inflation on purchasing power

Why is a monopoly sometimes necessary if wants are to be satisfied?

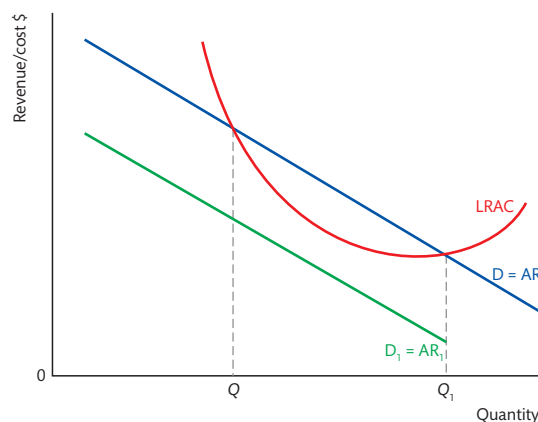


Figure 33.1

The case of natural monopoly

In some industries the **total fixed costs** are very high. They represent a high proportion of the firm's **total costs**. Fixed costs do not change with output therefore the **average fixed cost**, that is fixed cost per unit, is very high at low levels of output and falls as output rises. Only when the monopolist controls all of the market, leading to very high levels of output, can the high fixed costs be covered by revenue (price \times quantity). **Long-run average costs** fall because the firm has all the market and can enjoy all the available **economies of scale** (see pages 69–71 for a full explanation of economies of scale).

The demand curve and average revenue curve $D = AR$ represents **demand** when the firm has 100% **market share**. Between output Q and Q_1 price is greater than long-run average cost therefore the monopolist earns positive economic profits. When another firm or firms enter the market the incumbent firm's demand falls at each price and the demand curve shifts to the left to $D_1 = AR_1$. There is no level of output where price is equal to or greater than average cost, therefore at any level of output the firm makes a loss. It can be assumed other firms will face similar **cost structures** and they too would not be able to make normal profit in the end. Therefore, all firms would **shut down** production and the good or service would not be supplied leading to **significant welfare loss**. Natural monopolies tend to exist in industries where there are very high infrastructure costs such as gas and electricity suppliers and water and sewage services. The cost for each of the firms of laying the pipes over the same vast areas, and of maintenance, means that the competing firms would not be able to cover the enormous fixed cost of the infrastructure and would not, because of their size, enjoy all economies of scale. This is why in many countries state monopolies were created to provide these services.

Compare output and price under perfect competition and under monopoly

In perfectly competitive markets firms have no **market power**. They are unable to influence **market price** or output. The forces of **market demand** and **market supply** determine industry equilibrium price and output. Firms are price takers. If price is greater than average total cost the firm earns positive economic profit on each unit sold but only in the short run. Firms have perfect knowledge of profits earned in the industry and in other perfectly competitive industries, **factors of production** are perfectly mobile and there are no **barriers to entry** preventing new firms from competing for the high profit. Therefore, new firms enter the industry increasing market supply causing a fall in price and driving profit down to normal. The degree of competition determines price and output.

A monopolist on the other hand is the industry. The firm has market power. It can set price or output and can earn positive economic profit in the long run because, unlike in perfect competition, new firms are not able to enter the industry and compete. Therefore, market supply does not increase and price and profit are not driven down leaving the monopolist earning abnormal profit in the **long run**.

Model sentence: Price and profit are lower and output is higher under perfect competition than under monopoly because in perfectly competitive markets there are no barriers to entry so new firms can enter the industry to compete for the high profits thereby increasing market supply and driving price and profit down.

Compare welfare and efficiency under perfect competition and under monopoly

Consumers pay a higher price and consume fewer goods under monopoly than under perfect competition. The monopolist is able to reduce **consumer surplus** and increase **producer surplus** thereby reducing consumer welfare and increasing producer welfare. As price is higher, **real incomes** fall. The consumer can buy fewer goods and satisfy fewer wants with the same income thereby reducing the consumer's welfare.

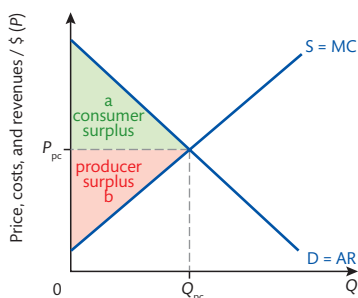


Figure 33.2a

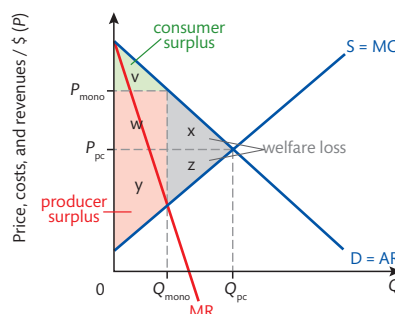


Figure 33.2b

Subject vocabulary

total fixed cost the sum of the costs that do not change as output changes

total cost the sum of total fixed cost and total variable cost

average fixed cost is equal to total fixed cost divided by quantity of output

long-run average cost the cost per unit of output when all factors are variable

economies of scale the cost advantages gained by a firm from increasing the scale of its production. Average cost falls in the long run as the size of a firm's operation increases.

demand the amount of a good that consumers are willing and able to buy at each price

market share the proportion of the market supply of a good or service that is controlled by a firm

cost structure the amounts of fixed costs and variable costs incurred by a firm when producing a good or service

welfare loss the sum of the loss of consumer and producer surplus caused by intervention or lack of competition in markets

market power the ability of a firm to change the market price of a good or service

market price the price determined by the interaction of demand and supply in a competitive market

market demand the sum of the demand of the individual consumers in the market

market supply the sum of the supply of the individual firms in the industry

factors of production the inputs into the production process (land, labour, capital and entrepreneurship)

barriers to entry factors that prevent/make difficult the entry of new firms into an industry or market

continued on page 90

Glossary

shut down stop operating

Synonyms

significant major/large

Subject vocabulary

free market a market where the forces of demand and supply are allowed to operate without any forms of intervention

price elastic the percentage change in quantity demanded/supplied > the percentage change in price

demand curve a graph that shows the relationship between price and quantity demanded

marginal revenue the additional revenue generated from the sale of the additional unit of output produced

marginal cost the change in total cost resulting from a change in output of one unit

profit the difference between total revenue (price × quantity sold) and economic costs (explicit costs + implicit costs)

allocative efficiency the best or optimal allocation of resources from society's point of view. It occurs when the market is in equilibrium and social surplus is maximized (where $P = MC$).

resources the inputs into the production process, the factors of production

productive efficiency occurs when a given quantity of output is produced at the minimum total cost per unit of output

abnormal/supernormal profit occurs when economic profit is greater than zero, i.e., when total revenue is greater than total cost (explicit and implicit costs)

X-inefficient a lack of technical and productive efficiency that exists in large firms

perfect competition a theoretical market structure which has the required characteristics that ensures no buyer or seller has the power to be able to influence market price

Glossary

steeper has a higher/bigger angle/gradient

Synonyms

consumption ... use

reallocate(d) ... redistribute(d)

Figure 33.2a shows equilibrium in the market under perfect competition. Price and output are determined solely by the forces of demand and supply in a **free market**. Figure 33.2b shows price and output in the market under monopoly where the firm is the industry and price and output are determined by the monopolist. It is assumed that the sum of the costs incurred by the firms in a perfectly competitive industry are equal to the costs incurred in the industry if it were controlled by a monopolist.

The monopolist faces a downward-sloping demand curve unlike the firm under perfect competition which faces a **perfectly elastic demand curve**. (Figure 33.2a shows a downward-sloping demand curve because it is the demand curve for industry not the firm.) The slope of the monopolist's **marginal revenue** curve is **steeper** than its demand curve and lies below it (see pages 71–3 for a detailed explanation of the relationship between the demand curve and the marginal revenue curve). In Figure 33.2b the monopolist sets output at Q_{mono} where marginal revenue equals **marginal cost** in order to maximize **profit**. Note that Q_{mono} , which is output under monopoly is lower than Q_{pc} which is output under perfect competition and the price under monopoly, P_{mono} , is higher than P_{pc} which is price under perfect competition.

Area a represents consumer surplus in a free market under perfect competition and this falls to area v under monopoly as price is higher. Area b is producer surplus in the free market and rises to area w + y under monopoly. Area x + z is the welfare loss caused by monopoly power. Area x is the loss of consumer surplus and area z is the loss of producer surplus. Area y + w is the area representing producer surplus under monopoly. Note that the monopolist loses area z but gains area y. $y + w > y + z$, therefore producer surplus increases. This is why the monopolist uses its market power to reduce output.

Model sentence: The monopolist has market power and therefore can increase price by reducing output in order to earn abnormal profit leading to an increase in producer surplus at the expense of consumer surplus.

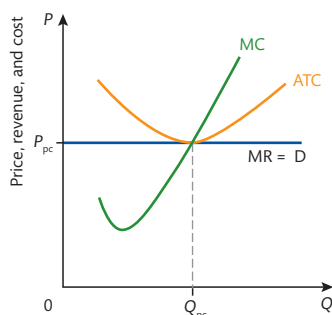


Figure 33.3a

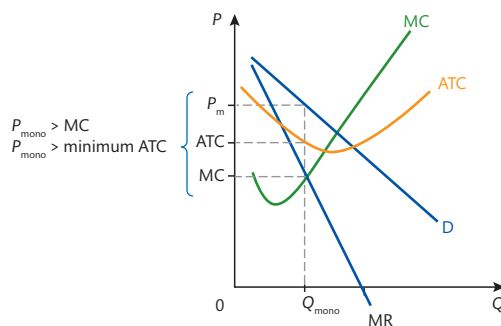


Figure 33.3b

Figure 33.3a shows the firm's long-run equilibrium position under perfect competition. Note that price equals marginal cost at profit-maximizing level of output. This is the condition for **allocative efficiency** (see pages 82–4 for a full explanation of the efficiencies). Under monopoly in Figure 33.3b price is greater than marginal cost at profit-maximizing level of output and therefore is not allocatively efficient. The price, which is the value consumers in society place on the **consumption** of the additional unit, is greater than the marginal cost, which is the value of the resources used to produce it. Therefore the welfare of the consumers in society can be increased by **reallocating resources** away from the production of other goods to the production of the good in order to increase output and reduce price until price equals marginal cost.

Productive efficiency is achieved when a unit of output is produced at lowest possible average cost. Note under perfect competition at Q_{pc} average total cost equals marginal cost. This is the condition for productive efficiency because marginal cost equals ATC at ATC's lowest point. Under monopoly ATC is greater than marginal cost. The firm is not minimizing its ATC therefore it is productively inefficient. The monopolist is able to survive in business despite being productively inefficient because the firm is earning **abnormal profit**. Technical efficiency occurs when the output from a given quantity of labour and capital is maximized. If a firm is able to increase output with a given quantity of labour and capital then it is technically inefficient. **X-inefficiency** occurs when technical efficiency is not achieved. Under **perfect competition**, a firm that does not use the resources it owns efficiently will make a loss and not survive in the long run. It is not essential for a monopolist to use the resources it owns efficiently because the lack of competition and abnormal profit ensures the monopolist can remain in business. The incentive to be technically efficient is not so great for the monopolist.

Model sentence: At the profit-maximizing level of output of a monopolist, price is greater than average total cost, therefore it earns positive economic profit; price is greater than marginal cost therefore it is allocatively inefficient; average total cost is greater than marginal cost therefore it is productively inefficient, and it can be technically inefficient and still survive because the monopolist does not face any competition.

Explain why the existence of monopoly power is not always against the interest of the consumer

There are lots of firms that have monopoly power, such as Apple and Sony. These firms enjoy **substantial economies of scale** (see pages 69–71 for a full explanation of economies of scale). Given that such a firm produces at very high levels of output their long-run average cost is very much lower than if the firm were

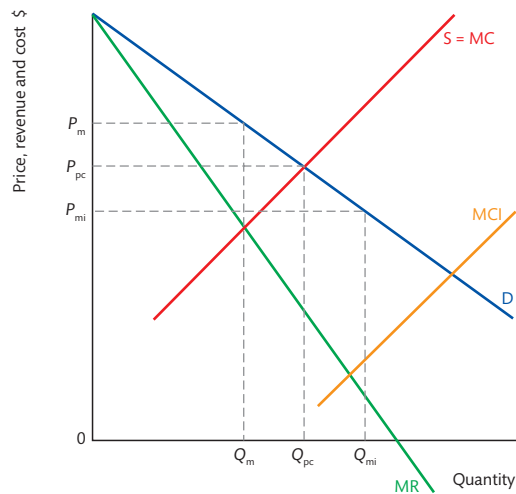


Figure 33.4

The firm with monopoly power earns **positive economic profit** not available to a firm in the long run under perfect competition. Money is available for research and development and therefore the monopolist is able to innovate and bring to market many new goods, far more than would be developed and brought to market under perfect competition. New goods create new wants that can be satisfied, potentially increasing **consumer welfare**. Monopolists supply large markets and enjoy huge economies of scale. Average costs are therefore relatively low making the industry internationally competitive, leading to an increase in the sale of exports and greater employment in the industry.

Test your understanding of this unit by answering the following questions

- Is monopoly bad for the consumer?
- Compare and contrast efficiencies under perfect competition and monopoly.

Synonyms

- substantial** large
- enhanced** improved/
made better
- characteristics** .. features

Subject vocabulary

economies of scale the cost advantages gained by a firm from increasing the scale of its production. Average cost falls in the long run as the size of a firm's operation increases.

positive economic profit occurs when the difference between total revenue and total costs (explicit and implicit costs) is greater than zero

consumer welfare a measure of the benefit obtained from the consumption of goods

Learning Outcomes

- Describe, using examples, the assumed **characteristics** of monopolistic competition: a large number of firms; differentiated products; absence of barriers to entry and exit.
- Explain that product differentiation leads to a small degree of monopoly power and therefore to a negatively sloping demand curve for the product.
- Explain, using a diagram, the short-run equilibrium output and pricing decisions of a profit-maximizing (loss-minimizing) firm in monopolistic competition, identifying the firm's economic profit (or loss).
- Explain, using diagrams, why in the long run a firm in monopolistic competition will make normal profit.
- Distinguish between price competition and non-price competition.
- Describe examples of non-price competition, including advertising, packaging, product development, and quality of service.
- Explain, using a diagram, why neither allocative efficiency nor productive efficiency are achieved by monopolistically competitive firms.
- Compare and contrast, using diagrams, monopolistic competition with perfect competition, and monopolistic competition with monopoly, with reference to factors including short-run, long-run, market power, allocative and productive efficiency, number of producers, economies of scale, ease of entry and exit, size of firms, and product differentiation.

Glossary

implicit describes something that is understood but not often directly stated

slope the angle/gradient of the curve

steep how high/big the angle/gradient is

Subject vocabulary

market structure the structure is determined by the characteristics of a market and it is the characteristics that affect the level of competition, prices and profit

benefit the satisfaction gained from the consumption of a good

industry a group of firms that produce the same or similar goods or services

collude to act together with others to achieve a common goal, such as raising prices/maximizing profit

differentiated goods

substitute goods that in some way have been made distinct, often through branding

barriers to entry factors that prevent/make difficult the entry of new firms into an industry or market

market share the proportion of the market supply of a good or service that is controlled by a firm

branding the process of creating a distinct logo, name, and image for a good in order to make it different from other goods in the market

quantity demanded the amount of a good consumers are willing and able to buy at a given price over a given period of time

price elasticity of demand (PED) a measure of how quantity demanded responds to a change in price in percentage terms

negative sloping a downward-sloping line that represents the negative relationship between the two variables

marginal unit the next or the additional unit of output produced or consumed

What are the assumed characteristics of monopolistic competition?

The **implicit** assumptions in all **market structures** are that the firms' objective is to maximize profit and consumers aim to maximize **benefit**. The assumptions of monopolistic competition are very similar to those of perfect competition. There is only one major difference. In perfect competition all goods are homogeneous (identical) whereas in monopolistic competition firms produce goods that are heterogeneous or differentiated (varied/not the same). As in all market structures the assumed characteristics have consequences. They affect the behaviour of consumers and firms, and ultimately affect the levels of profit and efficiency.

Describe the effects of the assumed characteristics of monopolistic competition – a step-by-step guide (the characteristics are in bold italics)

Trouble shooter

There are many firms and buyers in the market: the actions of individual consumers or firms have little if any effect on the **industry** as a whole. There are many firms so it is not possible for them to **collude**.

The firms in the industry produce differentiated goods: the consumer can tell the difference between the goods. The goods are substitutes but consumers may prefer one good over another. This gives the firm some price setting power.

The industry has very low barriers to entry or to exit: existing firms in an industry cannot stop new firms entering the industry, and existing firms can leave one industry and use their resources to produce goods in another industry very easily.

Examples of monopolistically competitive industries include beauty salons, hairdressers, clothes retail outlets, restaurants, car repair shops, painting and decorating, plumbers, and electricians. Note that these industries tend to contain a large number of small firms and have comparatively low and few barriers to entry. All firms in monopolistic competition try in some way to differentiate themselves from the competition in order to gain enough **market share** to maximize profit.

Why do firms under monopolistic competition face a downward-sloping demand curve?

The goods produced by the firms in the industry are differentiated for example by **branding**, quality, packaging, design, style, and colour. Some consumers may prefer a good produced by a particular firm, for example people are very loyal if they have received good customer and after-sales service. Whatever the reason, if a consumer believes that he/she gains comparatively greater benefit from the consumption of a good from a particular firm he/she will value it more highly than the substitute goods and will be prepared to pay a higher price. A firm can raise price and **quantity demanded** does not fall to zero as it would under perfect competition where **price elasticity of demand** = infinity and the firm faces a horizontal demand curve. The firm in monopolistic competition faces a downward, **negatively sloping** demand curve indicating that the firm has some market power and can affect price. Where there are many close substitutes available PED is more elastic and the **slope** of the demand curve is less **steep**. The PED of successfully branded goods, for example, will be less elastic and the slope of the demand curve steeper because in the eyes of the consumers the branded good is perceived to be different from and better than the substitutes. Consumers value it more.

The firm is after all the sole supplier of its good. It has some price-setting ability but still faces lots of competition from firms selling substitutes. It is this that gives this market structure its name: monopolistic competition.

Model sentence: ***The greater the benefit the consumer enjoys from the consumption of the marginal unit the greater the value the consumer places on that unit and therefore the greater the price the consumer will be prepared to pay for it. If the firm can, through differentiating the good, increase the benefit the consumer enjoys from the consumption of the marginal unit it can charge a higher price.***

Why do firms in monopolistic competition only make abnormal profit in the short run?

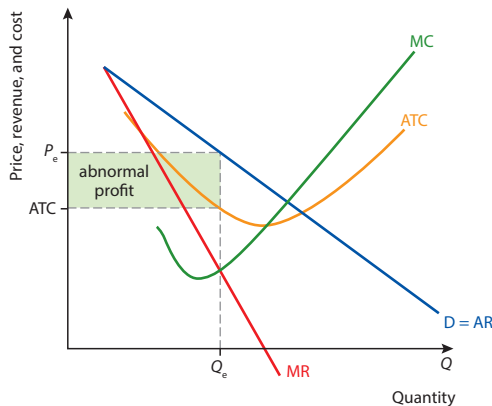


Figure 34.1 Short-run position

Figure 34.1 shows the **short-run** position for a firm in monopolistic competition. At profit-maximizing level of output where $MR = MC$ the price is greater than **average total costs**, therefore the firm earns **positive economic profit** or abnormal profit on each unit sold. Total abnormal profit = $(P_e - ATC) \times Q_e$ and is represented in the diagram by the rectangle labelled abnormal profit (see pages 74–6 for a full explanation of economic profit).

Explain how abnormal profit is driven down to normal profit in the long run – a step-by-step guide

Trouble shooter

Firms and potential **entrepreneurs** have very good knowledge so they know that abnormal profits are being earned.

There are few and low **barriers to entry** and **factors of production** are mobile so new firms can easily enter the industry in order to compete for the **abnormal profit**.

The market share of each firm falls as new firms enter the industry. Therefore, **demand** falls and the demand curve shifts down and to the left.

New firms continue to enter until each firm's demand curve has shifted far enough to the left that their demand curves are just touching the average total cost curve at profit-maximizing level of output as shown in Figure 34.2.

At profit-maximizing level of output, where $MR = MC$, price = ATC. Each firm in the industry is now earning normal profit.

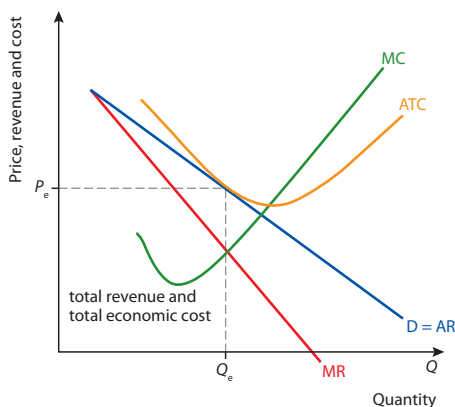


Figure 34.2

Model sentence: In the long-run under monopolistic competition each firms' total revenue (price \times output) equals their total economic costs (ATC \times output). **Zero economic profit** is earned by each firm because revenue is only just covering all costs including the cost of the purchased resources (explicit costs) and the opportunity cost of the self-owned resources (implicit costs).

Note the area representing total revenue (price \times quantity) is the same size as the area representing total economic costs (ATC \times quantity).

Subject vocabulary

average revenue curve a curve which represents the average revenue over a range of output (= total revenue/output). It is the same as the demand curve.

marginal revenue curve a curve which represents the marginal revenue over a range of output

output the quantity of goods produced by a firm, industry or economy

short run a period of time when at least one factor is variable and the others are fixed

average total cost is equal to total cost divided by quantity of output

positive economic profit occurs when the difference between total revenue and total costs (explicit and implicit costs) is greater than zero

entrepreneur an individual who, in pursuit of profit, brings together the other factors of production in order to produce a good or service

barriers to entry factors that prevent/make difficult the entry of new firms into an industry or market

factors of production the inputs into the production process (land, labour, capital and entrepreneurship)

abnormal/supernormal profit occurs when economic profit is greater than zero, i.e., when total revenue is greater than total cost (explicit and implicit costs)

demand the amount of a good that consumers are willing and able to buy at each price

total economic costs the cost of all the resources used by a firm in the production of a quantity of goods or services. It is the sum of explicit and implicit costs

zero economic profit occurs when the difference between total revenue and total costs (explicit and implicit costs) equals zero. It is the same as normal profit.

Subject vocabulary

allocatively inefficient a market is allocatively inefficient when it is in disequilibrium, where price does not equal marginal cost leading to a suboptimal allocation of resources from society's point of view

productively inefficient describes a firm that is not producing goods at the lowest average cost

marginal cost the change in total cost resulting from a change in output of one unit

social welfare the sum of consumer and producer welfare. Social welfare is maximised where price equals marginal cost leading to an optimum allocation of resources from society's point of view

resources the inputs into the production process, the factors of production

positive economic profit occurs when the difference between total revenue and total costs (explicit and implicit costs) is greater than zero

long run a conceptual moment in time when all factors are variable

abnormal/supernormal profit occurs when economic profit is greater than zero, i.e., when total revenue is greater than total cost (explicit and implicit costs)

normal profits occurs when economic profit is equal to zero, i.e., when the difference between total revenue and total costs (explicit and implicit costs) equals zero

monopoly power the degree of control a firm has over the setting of price

marginal revenue the additional revenue generated from the sale of the additional unit of output produced

average revenue revenue per unit of output (= total revenue/output)

Synonyms

allocating distributing

Why are firms in a monopolistically competitive market inefficient?

Monopolistically competitive firms are **allocatively inefficient** and **productively inefficient** in the short

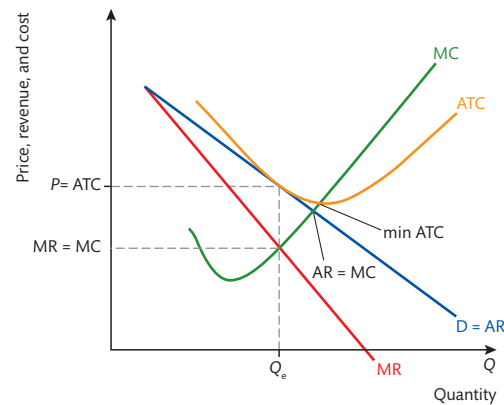


Figure 34.3

Productive efficiency is achieved when a unit of output is produced at lowest possible average total cost. Marginal cost cuts average total cost at average total cost's lowest point (as shown in Figure 34.3) therefore the condition for productive efficiency is $MC = ATC$ at profit-maximizing level of output. However in monopolistic competition, indeed in all market structures other than perfect competition, $ATC > MC$ when $MR = MC$, therefore a monopolistically competitive firm is productively inefficient.

Distinguish between monopolistic competition and other market structures

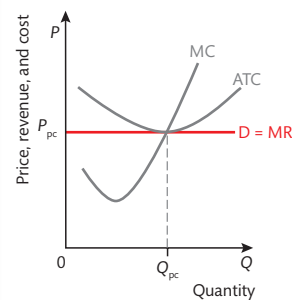


Figure 34.4a

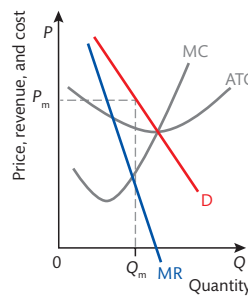


Figure 34.4b

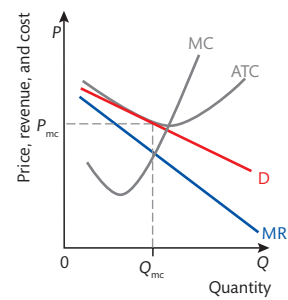


Figure 34.4c

All diagrams represent long-run equilibrium positions: a perfect competition, b monopoly, c monopolistic competition.

Positive economic profit can only be earned in the **long run** when barriers to entry prevent new firms entering the industry. This happens under monopoly whereas under perfect competition new firms, attracted by the **abnormal profit**, enter the industry as there are no barriers to entry. Industry supply increases reducing market price. The price the firm takes falls until price equals ATC and **normal profits** are once again earned. Under monopolistic competition there are very low barriers to entry so new firms enter the industry to compete for the abnormal profits. With more firms in the industry each firm's market share falls leading to a fall in demand. The demand curve of the existing firms shifts down and to the left. New firms continue to enter the industry until each firm's demand curve has shifted far enough to the left that their demand curves are just touching the average total cost curve at profit maximizing level of output. $AR = ATC$ therefore only normal profit is earned.

The condition for allocative efficiency is $P = MC$. A firm with any amount of **monopoly power** faces a downward-sloping average revenue curve. **Marginal revenue** falls at a faster rate than **average revenue** (AR is equivalent to price) therefore marginal revenue is less than price at all levels of output other than zero (see pages 90–93 for a full explanation of efficiency under monopoly). This means that at any profit-maximizing level of output, where marginal revenue equals marginal cost, price is greater than marginal cost. Under perfect competition the firm faces a horizontal average revenue curve. Price equals marginal revenue so when the firm sets output where $MR = MC$ price equals marginal cost and allocative efficiency is achieved (see pages 82–4 for a full explanation of allocative efficiency when demand is perfectly elastic).

Model sentence: In all market structures, other than perfect competition, the firm faces a downward-sloping demand curve so price is greater than marginal cost when profits are maximized. Therefore all imperfectly competitive markets are allocatively inefficient.

Neither monopoly nor monopolistic competition is productively efficient. Output is restricted in order to gain higher profit so the firm fails to produce at the lowest possible average total cost. Note on Figure 34.4b and c that when $MR = MC$ output is not at the lowest point on the ATC curve, whereas under perfect competition, shown in Figure 34.4a, the firm is producing at the lowest point on the ATC curve and is therefore productively efficient. The monopolist faces no competition and earns abnormal profit in the long run so its incentive to use its resources in the most efficient way is diminished leading to **technical inefficiency**. When firms are in competitive markets they must use their resources to produce the maximum possible output otherwise they will not survive.

A monopolist, unlike firms under perfect and monopolistic competition, might enjoy massive **economies of scale** and therefore can reduce average total costs in the long run. As argued in pages 90–93, the existence of monopoly power is not always against the interest of the consumer. It is possible that average total cost and price could be lower under monopoly than in more competitive markets and the higher profits earned in the long run by the monopolist might lead to lots of R&D so more new goods will come onto the market creating new wants that consumers can satisfy thereby increasing **consumer welfare**.

In a perfectly competitive world consumers have no choice. All goods in all industries are the same, while the monopolist has no incentive to differentiate output. Under monopolistic competition there is both price and **non-price competition**. Firms must consider the pricing strategies of its competitors when setting price and differentiate their goods in order to gain and maintain **market share**. This gives the consumer a choice between a variety of similar goods in all industries.

Distinguish between price competition and non-price competition

Goods produced by the firms in a monopolistically competitive industry are substitutes. A firm lowers price to try to get consumers to switch expenditure and buy their good rather than a rival firm's good and to bring new consumers into the market. When setting price firms consider the prices charged by other firms in the industry.

Firms also take part in non-price competition through, for example, promotions and advertising, 'style' of packaging, colour, quality of customer and after-sales service, quality of the product, and loyalty cards. Advertising is a very important way in which firms differentiate their goods. A firm's advertising campaign has two main purposes: to increase demand causing the demand curve to shift down and to the right thereby increasing revenue (price \times quantity) and profit, and to make demand more **price inelastic** causing the demand curve to become steeper (demand curve rotates clockwise). The firm then might be able to increase total revenue by raising price because quantity demanded is now less responsive to changes in price (see pages 22–4 for a full explanation of the relationship between PED and revenue).

Test your understanding of this unit by answering the following questions

- Using diagrams to illustrate your answer, explain why abnormal profit cannot be earned in the long run under monopolistic competition.
- Compare and contrast allocative efficiency and productive efficiency under monopolistic competition and perfect competition.
- Explain why competitively monopolistic firms differentiate their goods.

Subject vocabulary

imperfectly competitive market a market that is not perfectly competitive, therefore producers or consumers have a degree of market power, allowing some control over price

technical inefficiency occurs when the given inputs into the production process are not combined in such a way as to maximize output

economies of scale the cost advantages gained by a firm from increasing the scale of its production. Average cost falls in the long run as the size of a firm's operation increases.

consumer welfare a measure of the benefit obtained from the consumption of goods

non-price competition a strategy whereby one firm makes its good or service different from those produced by other firms in the industry in order to gain market share

market share the proportion of the market supply of a good or service that is controlled by a firm

price inelastic the percentage change in quantity demanded/supplied $<$ the percentage change in price

Glossary

dilemma difficult choice

Learning Outcomes

- Describe, using examples, the assumed characteristics of an oligopoly: the dominance of the industry by a small number of firms; the importance of interdependence; differentiated or homogeneous products; high barriers to entry.
- Explain why interdependence is responsible for the **dilemma** faced by oligopolistic firms – whether to compete or to collude.
- Explain how a concentration ratio may be used to identify an oligopoly.

Subject vocabulary

market structure the structure is determined by the characteristics of a market and it is the characteristics that affect the level of competition, prices, and profit

benefit the satisfaction gained from the consumption of a good

economic profit the difference between total revenue (price × quantity sold) and economic costs (explicit costs + implicit costs)

productive efficiency occurs when a given quantity of output is produced at the minimum total cost per unit of output

homogeneous goods goods that are exactly the same

differentiated goods substitute goods that in some way have been made distinct, often through branding

barriers to entry factors that prevent/make difficult the entry of new firms into an industry or market

niche market a relatively small specialized market within a much bigger market. For example, there is a mass market for chocolate but within this market there is a niche market for luxury chocolate.

long-run average cost the cost per unit of output when all factors are variable

interdependent firms are interdependent when each firm is affected by the decisions of the other firms and will react to the decisions of other firms. This is a characteristic of oligopoly.

collude to act together with others to achieve a common goal, such as raising prices/maximizing profit

market price the price determined by the interaction of demand and supply in a competitive market

Glossary

assumption(s) something thought/believed to be true but without proof

Synonyms

characteristics... features

significant major/large

rivals competitors

What are the implicit assumptions?

The implicit **assumptions** in all **market structures** are that the firms' objective is to maximize profit and consumers aim to maximize **benefit**. As in all market structures the assumed **characteristics** have consequences, affecting the behaviour of firms and consumers, **economic profits** that can be earned, and each firm's allocative efficiency and **productive efficiency**.

Describe the assumed characteristics of oligopoly and explain their effects – a step-by-step guide

Trouble shooter

A few large firms dominate the market producing **homogeneous goods** or **differentiated goods** in an industry with high **barriers to entry**. There might be lots of firms in the industry but most of them will have a relatively small proportion of market share often serving **niche markets**. The few large firms in the industry serve a mass market producing goods in very high quantities. The firms therefore experience **significant** economies of scale allowing them to produce at relatively low **long-run average costs**.

As there are only a few firms dominating the market selling homogeneous goods (such as steel, copper, wheat, and milk) or differentiated substitutes (such as cars, fizzy drinks, washing powder, and shampoo) they are **interdependent**. This means the decisions on price and differentiation (often achieved through branding) by one firm affect the other firms in the industry and will cause the other firms to react. Firms in the industry take into account how **rivals** might react before taking decisions. For example, if a firm increases price the firm knows other firms will react. How the firm thinks the others will react affects its decision. When one supermarket introduced 24-hour opening in the larger stores it knew this decision would cause its rivals to react.

As there are only a few firms in the industry selling homogeneous goods or differentiated substitutes it is possible for them to **collude** and set price or industry output in order to increase profit. Abnormal profits would attract the attention of potential rivals but it is difficult for new firms to enter the industry to compete for the high profits because of the high barriers to entry. Therefore firms in an oligopolistic industry can earn abnormal profit in the long run.

Explain why interdependence is responsible for the dilemma faced by oligopolistic firms – whether to compete or to collude

Under perfect competition there are lots of small firms in the industry. Each firm's output represents a very small proportion of total industry supply therefore each firm is unable to influence industry supply and therefore cannot, by increasing supply or decreasing supply, affect **market price**. The firms are independent. A decision by one firm does not affect other firms in the industry. Also there are so many firms in a perfectly competitive market it is not possible for them to collude and set price. This is not the case under oligopoly where collusion is practical because there are only a few firms. Also firms are interdependent. A decision made by one firm impacts on rivals and the other firms react to the decision.

Model sentence: Under oligopoly each firm's decisions relating to output, price, and differentiation are dependent upon the corresponding decisions made by the rival firms. Also there are only a few firms in the industry so it is possible for them to collude in order to set industry supply or market price. It is interdependency that gives rise to the two main theories of oligopoly: collusive oligopoly, a market where firms do not compete and non-collusive oligopoly, a market where firms do compete.

Explain how a concentration ratio may be used to identify an oligopoly

An industry dominated by two firms is called a **duopoly**. An oligopolistic industry might be dominated by three firms or more. The **concentration ratio** is the measure of the percentage market share in an industry held by the largest firms. Working out the concentration ratio of an industry is one way to establish its competitiveness. It is used to judge the market structure.

A concentration ratio is expressed in the form: CR_x where *x* represents the number of firms that control a percentage of total market share. CR₄ = 80% means that the four firms with the largest market share together produce 80% of the total output of the industry. If two firms merge the market becomes more concentrated with a new ratio CR₃ = 80%. CR₄ = 90% means that four firms together produce 90% of an industry's supply. This signifies a very highly concentrated market where the firms have a high degree of market power. Although it is possible that one of the four firms has 80% of total market share and the rest is split between the other three largest firms. In this situation the dominant firm has a very high degree of **monopoly power** and the market structure is more monopolistic than oligopolistic.

CR₅ = 5% means that the five firms with the largest market share together produce only 5% of total industry output signifying that they have no market power and that the industry is very competitive.

The five-firm concentration ratio for the supermarket industry in the UK is about 87% signifying that the industry is oligopolistic, whereas furniture manufacturing has a five-firm concentration ratio of 4% signifying it is a competitive market and not oligopolistic.

Test your understanding of this unit by answering the following questions

- Explain how a concentration ratio can determine the competitiveness of an industry.
- Explain why firms in oligopolistic markets are interdependent.

Subject vocabulary

duopoly a type of oligopoly where there are only two sellers. The term is also used to describe a market that is dominated by two sellers or two firms.

concentration ratio the proportion of market share controlled by a specified number of firms

monopoly power the degree of control a firm has over the setting of price

strategic interdependence a characteristic of oligopoly is the interdependence of firms. Each firm is affected by the decisions of the other firms and will react to the decisions of other firms. Strategic interdependence means that firms under oligopoly take this into account when making business decisions.

Learning Outcomes

- Explain how game theory (the simple prisoner's **dilemma**) can illustrate **strategic interdependence** and the options available to oligopolies.
- Explain the term 'collusion', give examples, and state that it is usually (in most countries) illegal.
- Explain the term 'cartel'.
- Explain that the primary goal of a cartel is to limit competition between member firms and to maximize joint profits as if the firms were collectively a monopoly.
- Explain the incentive of cartel members to cheat.
- Analyse the conditions that make cartel structures difficult to maintain.
- Describe the term 'tacit collusion', including reference to price leadership by a dominant firm.

Explain how game theory (the simple prisoner's dilemma) can illustrate strategic interdependence and the options available to oligopolies

Two criminals have been arrested for their part in a robbery. They are locked up in separate cells and are unable to communicate with each other. The police believe that the evidence against the two men may not be strong enough to gain a **conviction** at **trial** but the **prisoners** do not know this. The police want them at least to spend some time in prison so they present to each prisoner the same set of **plea bargains** as follows:

If both prisoner *x* and prisoner Y **confess**, the offer from the **prosecutor** is 4 years in jail.

If prisoner *x* confesses but prisoner Y denies having been involved in the robbery then *x* will be **released** and prisoner Y will go to jail for 12 years.

		Prisoner Y	
		Deny	Confess
Prisoner X	Deny	2 years / 2 years	Released / 12 years
	Confess	12 years / Released	4 years / 4 years

Table 36.1

If prisoner Y confesses but prisoner *x* denies having been involved in the robbery then Y will be released and prisoner *x* will go to jail for 12 years.

If prisoner *x* and prisoner Y both deny involvement in the robbery each will serve just 2 years in prison.

The information above is shown in Table 36.1

If both prisoners deny the **charges** each will serve a relatively short sentence of 2 years in prison. If both confess each will serve 4 years. If prisoner *x* denies any involvement and prisoner Y confesses prisoner *x* will serve the maximum 12 years and Y will be released and the same is true the other way around. The risk for the prisoners

Glossary

dilemma difficult choice

conviction court decision that someone is guilty of a crime

trial looking at evidence in a court to see if someone is guilty of a crime

prisoner(s) person/people in jail

plea bargain(s) agreeing to say something in court which shortens your jail time

confess admit to doing something wrong

prosecutor court lawyer trying to prove someone is guilty of a crime

charge(s) police statement(s) saying someone may be guilty of a crime

Synonyms

released freed

Synonyms

deter discourage

Subject vocabulary

oligopolistic market

describes a market that is controlled by a small number of firms

industry a group of firms that produce the same or similar goods or services

duopoly a type of oligopoly where there are only two sellers. The term is also used to describe a market that is dominated by two sellers or two firms.

profit the difference between total revenue (price \times quantity sold) and economic costs (explicit costs + implicit costs)

supply the amount of a good that a firm is willing and able to produce at each price

monopolist a firm that dominates an industry

cartel a collection of firms that agree to work together to maximize their joint profit

output the quantity of goods produced by an economy, firm, or number of firms

marginal revenue the additional revenue generated from the sale of the additional unit of output produced

marginal cost the change in total cost resulting from a change in output of one unit

productively inefficient describes a firm that is not producing goods at the lowest average cost

of denying the charge is very high. The risk of a long prison sentence is likely to **deter** each prisoner from denying involvement in the crime. So when the prisoners are unable to cooperate the most likely outcome is for them both to confess and serve the 4 years thereby avoiding the worst possible outcome: 12 years in prison. Therefore when prisoners do not cooperate they avoid the worst outcome but they do not achieve the best outcome possible which is two years in prison. The best outcome is possible only if they cooperate. Instead of confessing they would agree to deny any involvement in the crime and serve just 2 years in prison. Therefore the best outcome for the prisoners is achieved through cooperation.

Firms in an **oligopolistic market** must decide whether to compete or cooperate with their rivals on price. Each of the firms in the **industry** are selling close substitutes. Set out below is a version of the prisoner's dilemma game but this time set in the context of a **duopoly**.

Currently both firms set price at \$12 and are earning **profits** of \$13 million. Both firms are considering changing the price of their good but without colluding. Each firm knows that if they change the price it will cause the other firm to react in some way.

Firm Y can lower price or leave it at \$12. Firm Y knows that firm X has the same two options. If firm Y leaves the price at \$12 and firm X lowers its price to \$10 then firm Y's profit will fall from \$13 million to \$5 million whilst firm X's profits increase to \$15 million as lots of customers buy from firm X instead of firm Y. If firm X leaves the price at \$12 and firm Y lowers its price to \$10 then X's profit falls to \$5 million while Y's increases to \$15 million as lots of customers buy Y's goods instead of X's. If firm Y lowers price to \$10 and firm X does the same then profit for both firms falls from \$13 million to \$9 million. The worst possible outcome for firm Y is if it holds price at \$12 and firm X lowers its price to \$10. This is true the other way around. Therefore in order to avoid

		Firm Y	
		\$12	\$10
Firm X	\$12	\$13m \$13m	\$5m \$15m
	\$10	\$5m \$15m	\$9m \$9m

the worst possible outcome each firm will lower price leading to a fall in profit from \$13 million to \$9 million. Non-cooperation has not resulted in the best possible outcome for the two firms. If the firms collude they could agree to maintain price at \$12 and thereby achieve the best possible outcome: profit of \$13 million for both firms. This information is shown in Table 36.2.

Table 36.2

What is collusion and what is the primary objective of a cartel?

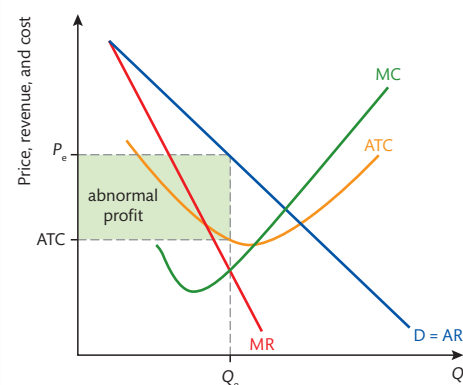


Figure 36.1

Collusion is an agreement between rival firms not to compete in order to raise price and to maximize joint profit. Collusion between firms can be formal and explicit. This means that firms have officially agreed to pursue strategies that are beneficial to them, although in most countries such agreements have been made illegal in order to protect consumer interest. Rivals will try to come to an agreement on a price that maximizes profit in the industry or may collectively agree to restrict the **supply** of the goods produced in the industry in order to maximize profits. Rivals might agree to not compete for market share with each other in particular parts of the country leaving each firm a **monopolist** in their own region of the country. A **cartel** is a group of firms which have entered into such agreements.

If the cartel includes all the firms in the industry it then has the power to decide on the level of **output** of the industry or set the price, just like a monopolist. Output, Q_e , is set at profit-maximizing point where **marginal revenue = marginal cost** giving price at P_e as seen in Figure 36.1. Price is greater than average total cost so abnormal profit of $P_e - ATC$ is earned on each unit sold. Total abnormal profit is $(P_e - ATC) \times Q_e$, the shaded area in Figure 36.1. A collusive oligopoly, like a monopoly, is **productively inefficient** because it does not produce at lowest possible ATC and it is allocatively inefficient as price is greater than marginal cost.

Model sentence: Firms collude to avoid the consequences of competition: lower prices and lower profit. By cooperating, firms are able to agree on industry output and price and thereby maximize profit.

Explain the incentive of cartel members to cheat and why they are unstable

In most countries cartels are illegal and members of an illegal cartel are likely to cheat. The price they agree is set high and profit earned is **abnormal**. If each firm has agreed to limit supply to an agreed **quota** it is very tempting for each of them to break the agreement and increase output in order to enjoy even greater profits. Also firms will not trust each other to keep their promise and the belief that other firms will in time break the agreement is often enough incentive for a firm to increase supply. This problem of trust is made worse the more firms there are in the cartel. Also the greater the number of firms the greater the difficulty of coming to agreements and **enforcing** each firm's quota.

The quota the firm has agreed to may not be at the firm's profit-maximizing level of output. If marginal revenue exceeds marginal cost at the firm's agreed level of output then the firm is likely to cheat and break the agreement by increasing output until marginal revenue equals marginal cost and profits are maximized thereby increasing total industry output.

Abnormal profits earned in the industry will attract new entrants and as long as some are able to overcome the barriers to entry, they will enter the industry thereby increasing industry output. Profits for firms in the industry will fall as they are now shared amongst more firms.

Model sentence: In a cartel where abnormal profit is being earned it is very tempting for a firm to increase supply to earn more profit. However, as the firm's output increases it causes industry output to increase beyond the industry's profit-maximizing level of output.

Describe the term 'tacit collusion', including reference to price leadership by a dominant firm

Collusion is illegal in many countries including the USA, and members of the European Union. Therefore firms in oligopolistic markets are more likely to engage in **non-collusive** activity or **tacit collusion** to avoid the disadvantages of competing.

Price leadership is a form of tacit collusion. The dominant firm in the oligopoly sets the price and the other firms follow the price. An example of this can be seen in the independent schools market in the UK. When the dominant school increases school fees the other schools increase their own. They will usually increase their fees so that price **differentials** are maintained. This is not something that has been formally agreed between the schools. It is an example of a hidden or tacit agreement. In this way schools do not compete directly on price.

Test your understanding of this unit by answering the following questions

- Explain why cartels are unstable.
- Explain the term 'price leadership'.
- Explain why firms in a cartel are tempted to cheat.
- What is the difference between formal collusion and tacit collusion?
- Why are firms in an oligopolistic industry tempted to collude?

Subject vocabulary

abnormal/supernormal profit occurs when economic profit is greater than zero, i.e., when total revenue is greater than total cost (explicit and implicit costs)

quota a physical limit placed on the number of goods that can be traded or produced

non-collusive describes a market where firms do not act together with others in order to achieve a common goal

tacit collusion a situation in which two or more firms in an oligopolistic market agree on a business strategy, without the agreement being explicit: it usually takes the form of price leadership

price leadership when firms follow the price set by the dominant firm in the industry

price rigidities the idea that prices can respond very slowly to changes in demand and supply therefore it can take a long time before a surplus or shortage is eliminated

Glossary

enforcing making people obey rules/laws

Synonyms

differentials.... differences

Learning Outcomes

- Explain that the behaviour of firms in a non-collusive oligopoly is strategic in order to take account of possible actions by rivals.
- Explain, using a diagram, the existence of **price rigidities**, with reference to the kinked-demand curve.
- Explain why non-price competition is common in oligopolistic markets, with reference to the risk of price wars.
- Describe, using examples, types of non-price competition.

Explain that the behaviour of firms in a non-collusive oligopoly is strategic in order to take account of possible actions by rivals

Firms in oligopolistic markets are interdependent. Each firm in the industry knows that any decision it makes will affect other firms and that other firms will react. So each firm will take into account the possible reactions

Glossary

dilemma difficult choice

assumption(s) something thought/believed to be true but without proof

differentiate make different

Subject vocabulary

pricing strategy a plan made and used by a firm with the aim of increasing revenue and profits through the setting of price

kinked-demand curve a kink or bend in the demand curve that is the result of firms reducing price in response to a competitor reducing price and keeping prices constant in response to a competitor increasing price

quantity demanded the amount of a good consumers are willing and able to buy at a given price over a given period of time

demand curve a graph that shows the relationship between price and quantity demanded

price elastic the percentage change in quantity demanded/supplied > the percentage change in price

market share the proportion of the market supply of a good or service that is controlled by a firm.

revenue the income a firm receives from consumers in exchange for goods (revenue = price × quantity sold)

price inelastic the percentage change in quantity demanded/supplied < the percentage change in price

price war when firms in the same industry progressively cut prices in an attempt to increase their market share

profit the difference between total revenue (price × quantity sold) and economic costs (explicit costs + implicit costs)

productivity the quantity of output per unit of input

average total cost equal to total cost divided by quantity of output

benefit the satisfaction gained from the consumption of a good

demand the amount of a good that consumers are willing and able to buy at each price

of the other firms before deciding what action to take. One model that examines the **dilemma** faced by firms when considering **pricing strategies** is the **kinked-demand curve theory**. This theory assumes that if a firm reduces price the other firms will do the same and reduce their prices and that if a firm increases price the others will react by holding their prices constant.

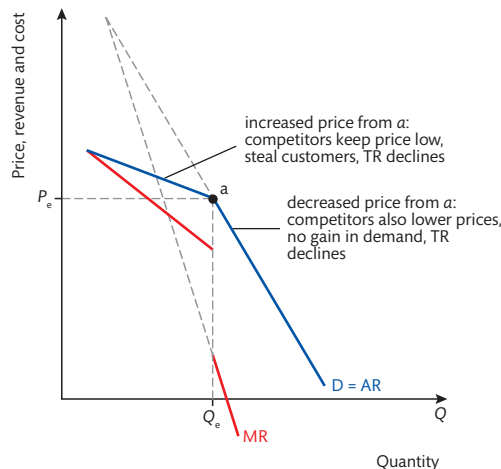


Figure 37.1

The firm considers reducing price but thinks that the other firms will match the price reduction for fear of losing market share. Therefore if the firm reduced price quantity demanded would rise as new consumers enter the market attracted by the lower price but it would not gain any new customers from other firms as all firms have reduced price. Therefore if the firm lowered price the percentage change in price would be greater than the percentage change in quantity demanded and so the demand curve below P_e is relatively **price inelastic**. If the firm reduces price it will lose revenue. The firm does not want to take the chance of this happening so decides not to reduce price. Also the firms do not want to get involved in a **price war** where firms continue to cut price in response to the reductions in price of the rival firms. If this happens then all firms will see a fall in **profit**.

Model sentence: A firm believes that if it changes price revenue and profit will fall because of the reactions of other firms. Therefore the firm does not change price. This applies to all the firms in the oligopolistic market so price in the market remains stable.

As the firms decide not to compete on price they must consider other ways to compete.

Describe types of non-price competition

As firms cannot increase market share, revenue, and profit through changes in price they try to do so in different ways. Firms try to increase **productivity** and reduce **average total cost** in order to raise profit. Firms will invest heavily in strengthening the brand. Firms try to **differentiate** their brand through advertising, trying to convince buyers in the market that the good will give them greater **benefit** than the substitutes. The firm not only wants to increase **demand** but also aims to make demand more price inelastic. They may focus on quality of product or after-sales service, packaging, and design. Non-budget airlines compete with each other on the quality of service and inflight meals for example. Independent schools compete on what they offer students such as music, art, and sport facilities and many compete on the results students achieve. Supermarkets compete on loyalty cards, opening times, and the range of products available in the store including non-food items such as clothes and electrical goods, and services such as dry cleaning.

Test your understanding of this unit by answering the following question

- Explain price stability in a non-collusive oligopolistic market.

Learning Outcomes

- Describe price discrimination as the practice of charging different prices to different consumer groups for the same product, where the price difference is not justified by differences in cost.
- Explain that price discrimination may only take place if all of the following conditions exist: the firm must possess some degree of market power; there must be groups of consumers with differing price elasticities of demand for the product; the firm must be able to separate groups to ensure that no resale of the product occurs.
- Draw a diagram to illustrate how a firm maximizes profit in third-degree price discrimination, explaining why the higher price is set in the market with the relatively more inelastic demand.

What is price discrimination?

Firms that charge different prices for the same or similar goods or services are practising **price discrimination**. A monopolist is the sole supplier of a good or service and has the **market power** to charge different prices to different types of customers. Examples include gas and electricity suppliers charging different prices to businesses and households and train companies charging a lower price for young people or a lower price for a journey at off-peak times. The cost of production of the goods and services sold is the same whether sold at a lower or higher price. Price charged is not related to the cost per unit. A firm price discriminates because doing so increases **total revenue** and profit.

What are the conditions necessary for price discrimination to exist? – a step-by-step guide

Trouble shooter

The **price elasticity of demand** for the good or service must vary from one type of customer to the next or one market to the next.

PED varies because the **quantity demanded** of a good or service by some consumers is more sensitive to changes in price than it is for other consumers.

The firm must have a degree of **monopoly power**. Price discrimination therefore could not take place under **perfect competition** where firms take the market price.

The firm must be able to separate customers or markets in some way and prevent customers from buying and then subsequently selling the goods or services to different customers or across different markets. For example, it must be possible for a rail company to stop a young person from buying a low-priced train ticket and then selling it to an older person at a higher price thereby making a monetary gain.

There are three degrees of price discrimination. First-degree price discrimination occurs when the firm charges the maximum price each buyer in the market is willing to pay for a quantity of goods. Second-degree price discrimination or 'excess capacity pricing' occurs when a firm sells its spare capacity at a lower price than the price originally charged. For example, a hotel that has lots of rooms unfilled might reduce price in order to increase sales of rooms. An airline might offer 'last-minute deals' to try to sell unsold seats.

Model sentence: Third-degree discrimination can occur when different types of customers or different markets have different price elasticities of demand but only if the customers or markets can be separated to prevent resale of the good.

Using a diagram to illustrate your answer explain how a firm maximizes profit in third-degree price discrimination

Consumers or markets that have relatively low elasticities of demand, when demand is **price inelastic**, are relatively insensitive to changes in price and therefore firms will set a higher price. For example, quantity demanded of a certain make of car may be less responsive to a change in price in the UK than in Italy. The car manufacturer will then set a higher price for the car in the UK than in Italy as long as the market can be separated to prevent resale.

Subject vocabulary

price discrimination the practice of selling the same product to different buyers at different prices in order to maximize revenue

market power the ability of a firm to change the market price of a good or service

total revenue price × quantity sold

price elasticity of demand (PED) a measure of how quantity demanded responds to a change in price in percentage terms

quantity demanded the amount of a good consumers are willing and able to buy at a given price over a given period of time

monopoly power the degree of control a firm has over the setting of price

perfect competition a theoretical market structure which has the required characteristics that ensures no buyer or seller has the power to be able to influence market price

price inelastic the percentage change in quantity demanded/supplied < the percentage change in price

Subject vocabulary

price inelastic the percentage change in quantity demanded/supplied < the percentage change in price

price elastic the percentage change in quantity demanded/supplied > the percentage change in price

revenue the income a firm receives from consumers in exchange for goods (revenue = price × quantity sold)

profit the difference between total revenue (price × quantity sold) and economic costs (explicit costs + implicit costs)

marginal revenue the additional revenue generated from the sale of the additional unit of output produced

demand curve a graph that shows the relationship between price and quantity demanded

marginal cost the change in total cost resulting from a change in output of one unit

allocatively inefficient a market is allocatively inefficient when it is in disequilibrium, where price does not equal marginal cost leading to a suboptimal allocation of resources from society's point of view

Glossary

slope the angle/gradient of the curve

steep how high/big the angle/gradient is

Commuters are charged different prices for rail journeys at different times because the train companies make assumptions about the type of consumer that travels at certain times. If travelling in the mornings and evenings at certain times it is assumed that customers are travelling to and from work. The train companies know that the journey is essential and that there are often few if any suitable substitutes available. Therefore demand will be relatively **price inelastic**. Those travelling for leisure purposes, who can travel in the middle of the day, have more suitable substitutes available and the journey is not a necessity therefore demand is relatively **price elastic**. Price charged varies depending on the elasticity of demand of the customers. Those with relatively price inelastic demand will be prepared to pay a higher price.

Airlines charge a much higher price for 'business class' than for a standard fare. This has little to do with the extra space given to business class travellers and the complementary drinks and higher quality meals. It has much more to do with the fact that often the firm that employs the traveller pays for the ticket and demand is relatively more price inelastic for firms than for individuals. This explains why flying is often more expensive during the week than at weekends. Airlines assume those flying during the week are business travellers.

If a customer needs to travel on that day a higher price will be charged than if the flight was booked in advance because there is a higher degree of urgency to travel and no or few substitutes are available. Therefore demand is relatively more price inelastic.

Another example is phone companies charging a higher price to businesses than to households for phone calls. The cost to the telephone company is the same in each case but because price elasticity of demand differs in the two markets a different price is charged.

Firms assume that old people and young people such as students are likely to have relatively low incomes and are very sensitive to changes in price. Businesses such as cinemas, restaurants, and hairdressers often charge a lower price to these type of customers.

Firms take advantage of the fact that elasticities vary to maximize **revenue** and **profit**. In Figure 38.1a and b the **marginal revenue** curves are drawn for each distinct market. Figure 38.1a shows the MR curve for market A and b for market B. The marginal revenue in markets A and B are added together to give the whole market's marginal revenue curve shown in Figure 38.1c. In market A demand is relatively more price inelastic than in market B therefore the **slope** of the **demand curve** in market A is steeper than the demand curve in market B. The MR curve is twice as **steep** as the demand curve (see pages 71–73 for a detailed explanation of the slope of the MR curve). It is assumed that the firm aims to maximize profit and will therefore set output in the market as a whole where marginal revenue equals **marginal cost** as shown in Figure 38.1c. The marginal cost is transferred across to the two distinct markets A and B as shown by the broken line. In each market output is set where $MR = MC$ and the price required so that quantity demanded is equal to the profit-maximizing level of output is read from the demand curve in each market. (See pages 74–76 for a detailed explanation of profit maximizing point.)

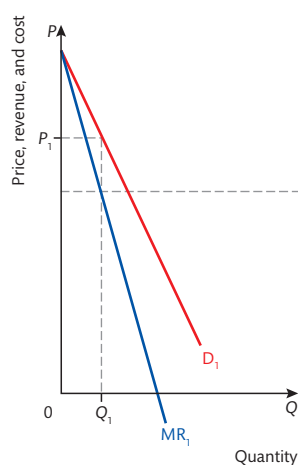


Figure 38.1a

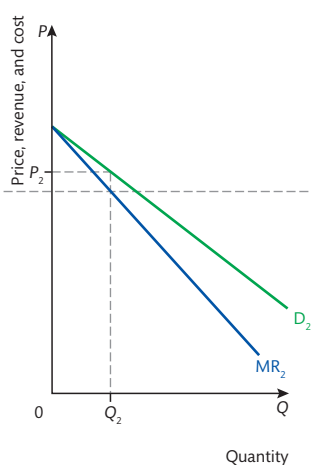


Figure 38.1b

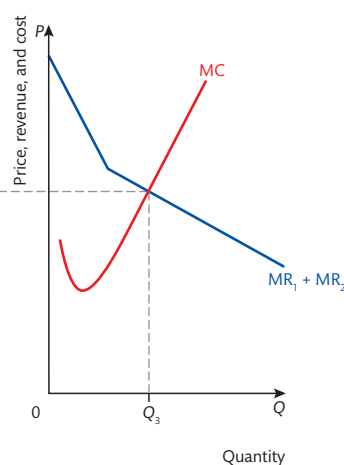


Figure 38.1c

Output in the relatively more price inelastic market A is restricted to Q_1 and price is set at P_1 . Price is higher and output is lower in market A than in the relatively more price elastic market B. This is a reflection of the different price elasticities of demand. Price is higher in market A because quantity demanded is less responsive to changes in price than in market B. Market A can bear a higher price.

The market is **allocatively inefficient** because price is greater than marginal cost in both markets. The value the consumer places on the consumption of the next unit of output, which is the price, is greater than the value

of the resources used to produce the unit, which is the marginal cost, therefore society's welfare would be increased if more **factors of production** were allocated to the production of the good. (See pages 82–4 for a detailed explanation of allocative efficiency).

It is possible that by price discriminating total industry output increases therefore the good or service is bought by more consumers. Price discrimination can benefit some consumers. At the lower price some consumers may be able to enter the market and gain benefit from the consumption of the good whereas if the price is set for the whole market it might be too high for those particular consumers. In this way there is a **welfare gain** for those particular consumers. However, many consumers will pay a price greater than a price set for the whole market. The firm captures their **consumer surplus** and welfare is lost (see pages 16–18 for a detailed explanation of consumer surplus and welfare).

Test your understanding of this unit by answering the following questions

- Using a diagram to illustrate your answer, explain how a firm maximizes profit in third-degree price discrimination.
- Explain the conditions necessary for price discrimination to occur.
- Explain how some consumers can benefit from price discrimination.

Subject vocabulary

factors of production the inputs into the production process (land/labour/capital/entrepreneurship)

welfare gain an increase in consumer or producer surplus

consumer surplus the difference between the price a consumer is willing and able to pay and the price the consumer actually pays

corporate social responsibility a concept whereby companies when making decisions consider the impact of their actions on society and the environment

Learning Objective

- Describe alternative goals of firms, including revenue maximization, growth maximization, satisfying, and **corporate social responsibility**.

Explain the difference in market outcomes if a firm pursues revenue maximization rather than profit maximization

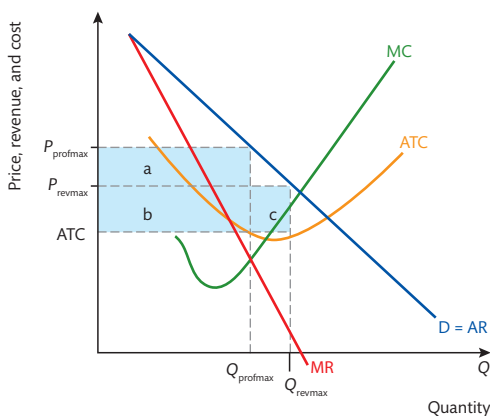


Figure 39.1

The theory of the firm rests upon the **assumption** that firms aim to maximize profit. In reality firms have many competing objectives, some of which conflict with the goal of profit maximization. One measure of how well a firm is performing is the amount of **producer revenue** made. Some managers might receive bonus payments if sales increase so they have an **incentive** to maximize revenue and not profit. (See pages 74–76 for a detailed explanation of marginal revenue, marginal cost, and profit maximization.)

Glossary

assumption(s) something thought/believed to be true but without proof

Subject vocabulary

producer revenue the income a firm receives from consumers in exchange for goods (revenue = price × quantity sold)

total revenue price × quantity sold

Synonyms

incentive... encouragement/motivation

Revenue maximization – a step-by-step guide (see Figure 39.1)

Trouble shooter

Marginal revenue is the addition to **total revenue** from producing and selling the next unit.

Therefore when marginal revenue is positive (up to Q_{revmax}) producing and selling the next unit will add to total revenue.

Beyond Q_{revmax} marginal revenue is negative therefore producing and selling output will reduce total revenue.

In order to maximize revenue the firm sets output where marginal revenue equals zero, Q_{revmax} on Figure 39.1, and charge P_{revmax} . At this point total revenue is at its highest.

Subject vocabulary

monopolist a firm that dominates an industry

abnormal/supernormal profit occurs when economic profit is greater than zero, i.e., when total revenue is greater than total cost (explicit and implicit costs)

pricing strategy a plan made and used by a firm with the aim of increasing revenue and profits through the setting of price

quantity demanded the amount of a good consumers are willing and able to buy at a given price over a given period of time

market share the proportion of the market supply of a good or service that is controlled by a firm

price elasticity of demand (PED) a measure of how quantity demanded responds to a change in price in percentage terms

price inelastic the percentage change in quantity demanded/supplied < the percentage change in price

sole trader a type of business that is owned and controlled by one person

public limited companies a form of business organization in which shares are offered for sale to the general public. Shareholders own the business and receive a share of the profits. Liability is limited to the amount paid for the shares.

shareholders individuals or institutions that own at least one share in a company. They are the owners of the company and are therefore entitled to a share of the profits.

divorce of ownership from control a situation that occurs in large companies where the owners, who are the shareholders, do not make the business decisions

Synonyms

forges... sacrifices/gives up

pursue.... follow

Glossary

plumber someone whose job is to repair water pipes

In order to maximize profit the **monopolist** sets output at Q_{profmax} where marginal revenue equals marginal cost. This is below revenue maximizing level of output. Profit maximizing price is greater than revenue-maximizing price. The profit-maximizing firm produces less and charges more than if its objective is to maximize revenue. When profit maximizing the firm earns **abnormal profit** of $(P_{\text{profmax}} - ATC) \times Q_{\text{profmax}}$ which is represented by the areas a + b. By reducing price and increasing quantity sold to maximize revenue, the monopolist earns abnormal profit of $(P_{\text{revmax}} - ATC) \times Q_{\text{revmax}}$ which is represented by area b + c. $(P_{\text{revmax}} - ATC) \times Q_{\text{revmax}} < (P_{\text{profmax}} - ATC) \times Q_{\text{profmax}}$. The firm gains area c of profit but **forges** the larger area and therefore profit falls.

Model sentence: When marginal revenue is positive producing and selling the marginal unit of output will add to total revenue. However, if the marginal cost of the additional output is greater than the marginal revenue then producing the marginal unit will lead to a fall in profit.

Why might a firm try to maximize growth rather than profit?

Growth is measured in a number of ways: quantity of goods sold, total producer revenue and size of market share. It is quite possible for a firm to follow a **pricing strategy** that in the short run leads to a fall in profit but in the long run might see profit rise. For example, a firm reduces price in order to increase **quantity demanded** and to get a foothold in the market and increase **market share**. Once the brand is established and **price elasticity of demand** is relatively more **price inelastic** the firm puts up price increasing both producer revenue and profit.

What is satisficing?

Satisficing is a combination of two words: satisfy and suffice. A **sole trader**, such as a **plumber** or a restaurant owner, not only owns the business but works in it and controls the decision making. **Public limited companies** are owned by **shareholders**. Shareholders do not work in the business, they do not control decision making. They simply take a share of the profits. The control of the business is separated from ownership. This is called the **divorce of ownership from control**. It is likely that shareholders want to maximize profit because this will benefit them, but the many employees may not share this aim. Sales managers, for example, may be paid bonus payments if they hit a sales target, therefore they will benefit if they maximize sales revenue even if an increase in output and sales reduces profit. Middle and senior management are often most interested in developing their careers and may well **pursue** policies that do not increase profit. These people know that they have to keep an eye on profit and earn enough to keep the shareholders happy but as long as this occurs they can keep their jobs while at the same time pursuing their own interests. Doing this is called satisficing: doing just enough to satisfy all stakeholders including the owners.

Why do large firms consider their responsibility to society when making decisions?

Many large firms are concerned about their brand image. If a firm treats its workers badly or harms the environment, for example, it will gain a bad reputation and damage the image of the brand which will have a negative impact on sales and profit in the long run. Also by being seen to do good works, such as funding community projects, donating large sums to charities, and using environmentally friendly methods of production the firm can gain a good reputation and strengthen the brand image. It is true that decision makers in the firm may want to do such things because of ethical considerations and that doing so will reduce profits in the short run. However, by strengthening the brand producer revenue and profit may well increase in the long run and it is more likely that this is the main consideration when making such decisions.

Test your understanding of this unit by answering the following question

- Discuss alternatives to profit maximization.